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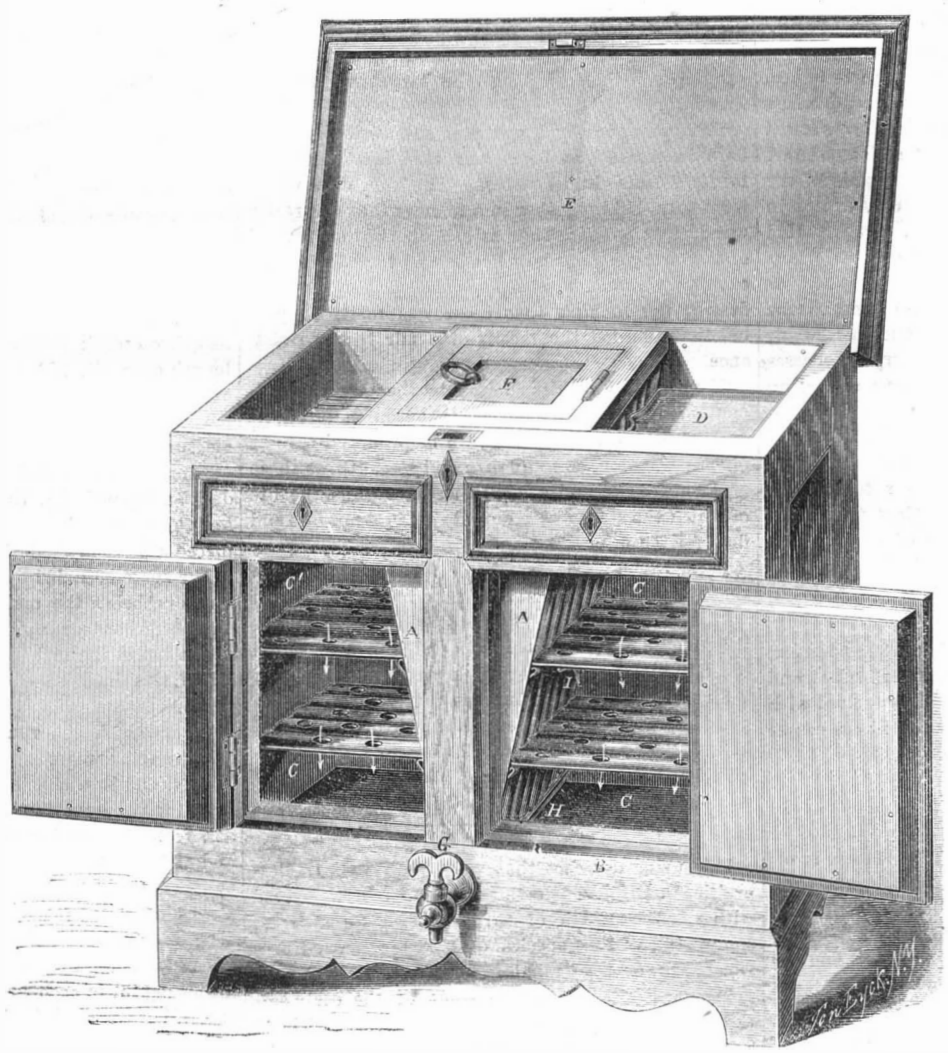
The Improved Polar Refrigerator.

It is generally conceded that a dry atmosphere is necessary to keep provisions fresh and sweet; the reason for this is that decomposed matter, from various sources, is held in suspension by the moisture in the atmosphere, and it is these impurities which inoculate meats, milk, &c., causing them to spoil quickly. In New Mexico and other tropical countries the people hoist their perishable food to the top of high poles, placed in the ground for that purpose, where the edibles are preserved in an excellent condition. There is nothing more essential to good health than having what we eat pure and fresh. In summer it is very difficult to preserve any alimentary substance in a proper condition for a length of time, without having recourse to artificial means. Our inventors have; therefore, provided refrigerators, which, by the employment of a small quantity of ice and due attention to the economical use of the same, as regards the disposition of the surfaces in immediate or remote connection with it, fully accomplish the end in view. Herewith we illustrate a very excellent decalorator, recently introduced to the public. The ice-box, A, is made in a wedge form of corrugated zinc, and is placed in the middle of the box, B, said box representing a side-board in appearance, and forms four separate and distinct provision chambers, C C C′ C′. One of these chambers can be used for ice, if desired, by placing an extra ice plank therein. There are also movable partitions, D, whereby two chambers can be thrown into one, for convenience of storing any article too large to be admitted in a single compartment. The ice is inserted through the door, F, and the large lid, E, opens into the upper chambers. The ice rests upon a rack in the box, and the water from it falls into the lower part of the wedge-like box, where it is retained for the frigorific qualities still remaining in it. Whenever necessary it can be withdrawn through the faucet, G. The water cannot, by any contingency, flood the floor. An arrangement is made for those who desire it, in an overflow pipe, so arranged that the warmest water passes through a small faucet, I, on the side of the chamber, and issues at the bottom of the refrigerator, through an opening there elaced. These are the principal details. The greatest feature of this cooling apparatus is the manner in which the moisture and impurities are taken from the provisions. This is done by having the cold corrugated sides of the ice and water boxes exposed to the provision chambers, whereon all moisture and impurities are condensed and caught by the trough, H, at the bottom of the case, C, and carried off through the waste pipe. The air circulates in the manner represented by the arrows, absorbing and bringing all impurities to the cold sides of the ice-box, leaving the delicate and natural flavors of the fruits and provisions unimpaired.



BARTLETT'S PATENT REFRIGERATOR.

The patent for this invention was procured on March 3, 1863, by A. H. Bartlett, of Spuyten Duyvil, N. Y.; further information respecting it may be had by addressing the inventor, at New York City. They are manufactured by Leslie & Elliot, 494 Broadway, New York, and H. C. Van Schaack, Chicago, Ill.

MORE EXPERIMENTS WITH IRON TARGETS—WHITWORTH AND ARMSTRONG GUNS.

On page 247, current volume of the SCIENTIFIC AMERICAN, we gave an account of a set of gunnery experiments that had taken place at Shoeburyness, England, on the 3d of March. Our last European exchanges bring us an account of another and more interesting set of experiments at the same place, on the 17th ult. As the science of gunnery, connected with the penetration of shot fired against iron plates, is in a transition state, and as but little reliable knowledge has been obtained on the subject, all records of such experiments are of great importance to men of science, to our ordnance officers and manufacturers of cannon. We are warranted, therefore, in giving considerable space in disseminating such information. The following is a condensed description of the experiments and is derived from the London *Times*:—

The target was 12 feet square, formed of three great plates of the best rolled iron; the upper one being 5½ inches thick, the middle one 7½ inches and the lower one 6½ inches. One half of the target was backed with teak-wood planking 10 inches in thickness, and the wood was backed with inside plates of iron 2½ inches in thickness. The other half of the target had the outside plates bolted to strong vertical iron ribs, but had no teak backing or inner skin plates. Six feet square of the target, therefore, were formed of 10, 9 and 8 inches in thickness of iron and 10 inches of teak. The quality of the plates was superior to any ever tested in a target. The firing was at a distance of 200 yards; and the guns tried consisted of the old smooth 68-pounder, Sir William Armstrong's 110-pounder service gun (with special steel shot cut down at the base to reduce them to 65 lbs. weight), Sir William's 300-pounder muzzle-loading rifled shunt gun, Mr. Whitworth's muzzle-loading 150-pounder or 7-inch gun, and Mr. Lynall Thomas's 9-inch or 300-pounder rifled muzzle-loading gun. Both these latter were made by Colonel Anderson, at Woolwich, on the built-up coil principle adopted by Sir William Armstrong; both were admirable specimens of workmanship, though, before the experiments commenced, Mr. Whitworth's gun was found to have a crack or flaw in the center steel tube round which the coils of wrought-iron are wound and welded in the course of manufacture. This defect prevented its being used in the course of the experiments except for one discharge with a live shell. Mr. Thomas's gun was an enormous piece of ordnance, nearly 18 feet long, weighing 16 tuns, and with a thickness of 17 inches of metal around the powder chamber at the breech. Though nominally

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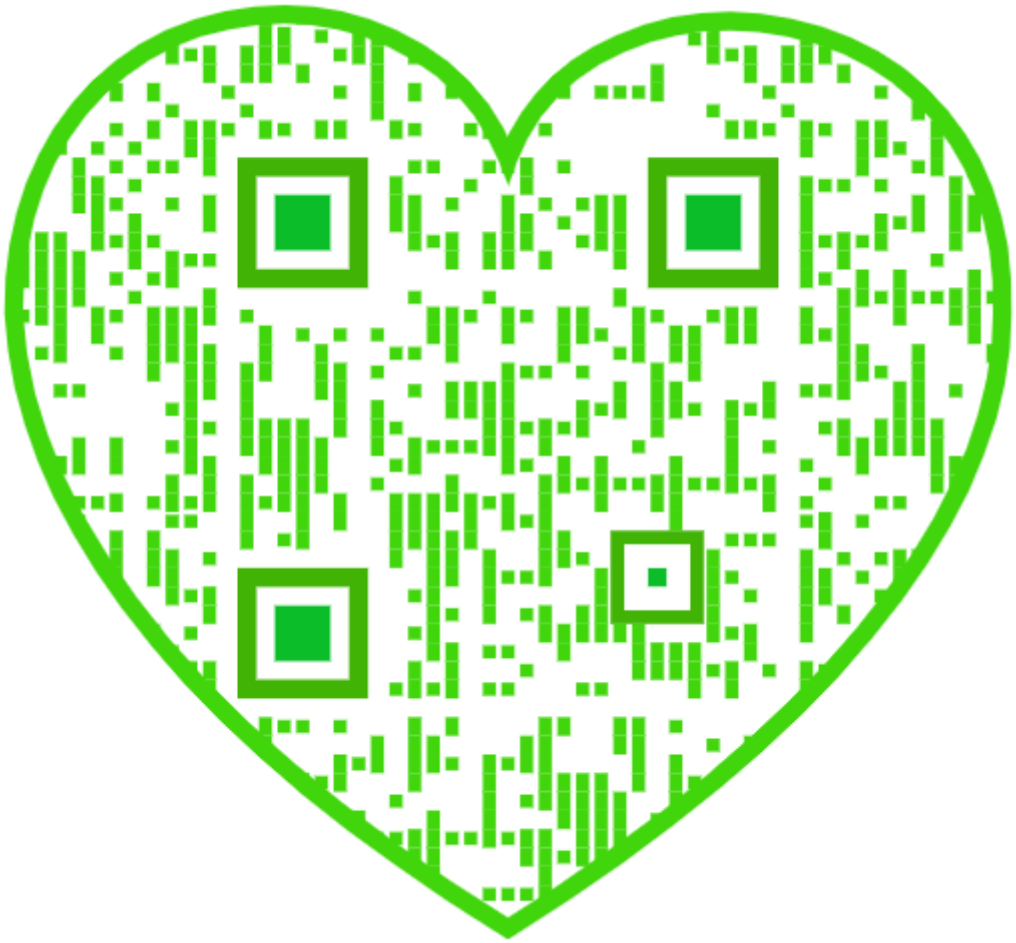

a 300-pounder, this gun is claimed to be capable of throwing projectiles of various forms and weight, from 250 lbs. up to 410 lbs. Sir William's 300-pounder weighs less than 12 tuns.

The first shots, three in number, were fired from the old smooth-bore 68-pounder with the usual service charge of 16 lbs. of powder; these were directed against the 5½, 6½ and 7½-inch plates, and were immediately followed by three shots from Sir William's 110-pounder, loaded with special steel projectiles weighing 65 lbs., and fired with the same service charge as the smooth-bore 68-pounder. Where the 68-pounder had struck, the indentation varied from 2½ inches to 3 inches in depth; where the steel shot of Armstrong's had hit, the mark was in one case deeper, and the plate showed a perceptible crack about 8 inches long, though apparently of very trifling depth. But the most careful examination failed to discover any mark on the back of the target to show that it had been hit at all.

The next shot was fired from Sir William's 300-pounder, loaded with a conical steel shot of 296 lbs. weight, and fired with 45 lbs. of powder. This tremendous missile struck with a velocity of 1,298 feet per second, full upon the center of the 7½-inch plate, where it was backed, driving in a circular piece of iron 10 inches in diameter quite through the plate, bending in the whole plate itself to the depth of an inch and a half, and buckling its ends outwards more than an inch. The massive wrought-iron girder which crossed the whole back of the target horizontally was bent out and broken in several places, as were also the inner ribs, the 2½-inch skin was bulged and cracked, the rivet heads loosened, and many knocked off altogether. The examination showed that the target had received a most serious shake, though, from the wonderfully good quality of the iron, there was little of actual fracture, except in the spot on which the shot itself had struck. Had the object struck been a ship's side, the damage would have caused a most serious leakage. It is hardly possible, however, to institute comparisons between any armor-clads yet known and this target, as no sea-going vessel could possibly carry the masses of iron that were here fired at, although a floating battery might. This last steel shot rebounded from the target, and, when examined, showed little signs of damage. All competing artillerists at Shoeburyness seem to agree that the range for testing the powers of rifled guns should not be less than 1,000 yards, at which distance the force of smooth-bore projectiles would be reduced one-half, while the rifled shot would be flying at nearly their greatest impetus.

The next shot was from Sir William's 300-pounder, loaded with a cast-iron shell weighing 286 lbs., and charged with 11 lbs. of powder. This was fired with the usual 45 lbs. charge, and struck full in the center of the 5½ inch backed plate with a velocity of 1,330 feet per second. It shattered its way completely through it, leaving a rough round hole about 10 inches in diameter, and then burst in the inside, blowing the teak to minute fragments, setting it on fire, breaking off many of the rivet heads, and tearing the inner skins of iron, 2½ inches thick, into rough shredded gaps, as if they had been so much cardboard. When water had been procured and the fire in the wood extinguished, it was seen at a glance that the question of the resistance which the strongest British iron frigates would be able to offer to such ordnance was settled in the most unpleasant manner. By the side of the target was a powerful partition of wooden beams, and an examination of this, after the shell had exploded, gave terrible proofs of its destructive powers. There was scarcely a square inch of its whole surface that was not deeply penetrated with fragments of the shell of all shapes and sizes, from one pound weight to ragged particles as minute as small shot.

Mr. Whitworth's 150-pounder was next tried, loaded with a steel flat-headed shell of 156 lbs. weight, with a bursting charge of 6 lbs. of powder, and fired from the gun with 25 lbs. of powder. This shell struck within about five inches of the spot where Sir William's had struck, burst and destroyed the teak backing. The Whitworth shell passed quite through the plate and burst among the *debris* of splinters behind. The hole in the plate was of the small, clean-cut, punched kind. It was claimed that it had as effectually gone through the plate with a 156 lbs. shell and 25 lbs. of powder as Sir William had with his 286 lb. shell and 45 lbs. of powder. Owing to the flaw in its breech no further trials were made with this gun.

Mr. Lynall Thomas's gun was the next competitor. Unfortunately the gun was not well pointed, and its first 330 lb. shot missed the target altogether. The next shot, weighing 307 lbs., and fired with a 50 lb. charge of powder, struck the hollow part of the target, where it was 7½ inches thick, and bent the plate. The third shot was more successful. It was a steel projectile of 330 lbs. weight, fired with the same charge. It struck on the edge of the 7½-inch plate, and made a broken indentation to the depth of 10½ inches, sufficient to establish the most alarming leak in the side of any vessel. The terminal velocities of both these last shots were lower than any fired, which was attributed to what is believed to be the excessive pitch in the mode of ribbed rifling adopted by Mr. Thomas.

Sir William Armstrong then fired his 300-pounder with an ordinary cast-iron round shot, weighing 144 lbs., with a charge of 45 lbs. of powder. The terminal velocity with which this struck the 7½-inch plate on the unbacked portion was the highest attained—no less than 1,636 feet a second—and almost in exact proportion to its velocity was the damage it inflicted. Not only was it indented larger and deeper than any shot that had gone before, but on the inner side it broke the plate both vertically and horizontally, leaving a cruciform tear nearly two inches wide at the openings, besides shaking the target to its very foundations.

The massive target was now so much damaged, both in plates and fastenings, that further experiments became almost useless. The iron, even where most torn, held together in a manner that was really wonderful; but Mr. Thomas had knocked off several of the massive screw bolt heads, and the effect of the entire day's work had been to so bend the plates and destroy the backing that there was really no part left that afforded the means of a fair test of resistance.

The practical results elicited by the day's experiments seem to be these—first, that iron plates of 7½ inches, or greater thickness, can be produced with as much perfection, as to quality and strength, as those of 4 inches; secondly, that there are guns the fire of which the strongest armor-clads could not face and float for ten minutes.

Perhaps the most remarkable fact connected with these experiments was the smashing of the target with a cast-iron shell. From previous experiments it had been concluded that all cast-iron shot would break in pieces in striking thick wrought-iron plates.

Sir William Armstrong has lately made a 600-pounder, weighing 24 tuns, and throwing a rifled ball of 600 lbs. or a shell of 590 lbs., to hold a 25 lb. bursting charge of powder. This gigantic piece of ordnance will soon be tried at Shoeburyness.

Growth of Timber.

It is a singular fact that what were vast treeless prairies in Illinois, twelve years ago, are now covered with a dense growth of thrifty young forest trees, comprising various species of oak, hickory, cottonwood, ash, &c.; so rapid has been this change in many localities, that where some of the early settlers located, twenty to twenty-five years ago, without a tree around them, they can now cut and hew good building timber a foot square. Prairie land, when kept from the annual fall burning formerly practiced by the Indians, rapidly produces a growth of trees. Some of the old citizens, who greedily located the timber land when they came to this country, and were careless about acquiring prairie, now find the latter of more value than the former; their timber has grown faster than they used it.

WHAT BECOMES OF THE SILVER?—It has long been known that vast quantities of silver have for centuries been carried to India, and that there it disappeared out of the circulation of the world like pebbles down a cavern. It is said that in the last twenty-five years $550,000,000 have been sent thither, of which $450,000,000 have thus disappeared. No probable reason has ever been discovered for this mystery, except the ancient Asiatic custom of burying specie and jewelry in the ground.

TRIAL TRIP OF THE "MORNING STAR."

The new steamship, *Morning Star*, recently built for the New York Mail Steamship Company, made a successful trial trip on the 9th inst., on which occasion we were present. The vessel started about 11 o'clock A. M., from the foot of Corlaers street (East River), with a large number of gentlemen, guests of the company, on board. The title of the new steamship company being unfamiliar to the public in general, it will not be amiss in this connection to give a brief account of its organization and the object for which it was designed.

THE NEW YORK MAIL STEAMSHIP COMPANY.

The New York Mail Steamship Company was organized under the laws of this State early in 1862, for the purpose of building a line of steamships to run between New York and New Orleans, *viâ* Havana, in the island of Cuba. Immediately after the organization of the company was complete, contracts were made for the construction of two first-class steamships, the *Morning Star* and *Evening Star*, which should, in addition to large space for cargo, have ample accommodations for from two hundred to two hundred and fifty first-class passengers. These ships should have been ready for service as early as December, 1862, but so difficult was it to obtain the requisite material and labor during the summer of that year, by reason of the large amount of work being done at that time for the Government, that the contractors, with all their exertion, have been unable to complete the *Morning Star* and deliver her to the company ready for service at any earlier date than April, 1863, during which month she will leave New York upon her first voyage. This has been accomplished by the energy of the president, John Raynor, Esq., and the vessel will leave on her regular route at an early date.

THE HULL.

The hull was built by Messrs. Rosevelt, Joyce & Co., of New York, and is of the following dimensions:—Length at the light load line, 266 feet; length on deck (custom-house measure), 273 feet; length over all, 283 feet; breadth of beam, 39 feet and four inches; depth of hold, 23 feet; tunnage (custom-house measure), 2,022$\frac{6}{95}$ tuns; carpenter's measure, 2,147 tuns.

There are two full decks, fore and aft (the main deck and spar deck), the main deck placed 8 feet below the spar deck, and 8 feet 3 inches above it is placed a promenade deck 212 feet in length.

The space occupied by the engine, boilers and coal bunkers, below the main deck, is inclosed by water-tight bulkheads, running from the floor of the ship to the top of the main deck beams, and forward and aft of this inclosed engine space are placed orlop decks.

THE ENGINE.

The engine was constructed by the Morgan Iron Works, and is a single beam engine with Steven's long-toe valve-motion, set so as to cut off the steam at 7 feet 6 inches from the bottom of the cylinder and at 5 feet 6 inches from the top of the same. The cylinder is 80 inches in diameter and has 12 feet stroke of piston; the water wheels are 33 feet in diameter to the outside line of the buckets; there are 28 buckets, with 10 feet 6 inches face and 18 inches depth, in each wheel. The engine is a superior one, all its parts being of extra size and strength and fitted and finished in the very best manner, making it capable of performing the severe labor at times required in ocean service without strain or injury to any part of it.

THE BOILERS.

The boilers, two in number, were constructed by the Allaire Works and are of the kind known as the tubular boiler. Each boiler has a front of 13 feet 7 inches wide, with three furnaces, the water bottom of which extends 12 inches below the shell. The two boilers contain a heating surface of 6,786 square feet; there are two blowers, each 5 feet in diameter, driven by engines with cylinders 14 inches in diameter and 14 inches stroke of piston. The blowers have been put in as a reserve power and will only be used when an extra amount of steam is wanted—the boilers being capable of generating, with natural draft, all the steam ordinarily required. There is an engine, with two cylinders of 6 inches in diameter and 12 inches stroke of piston, for hoisting cargo and an independ-

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ent boiler of sufficient size to supply it with steam, and also to supply, at the same time, the two steam pumps with which the ship is furnished.

THE ACCOMMODATIONS FOR PASSENGERS

The accommodations for passengers are very superior in every respect, all the staterooms being of large size and lighted and ventilated in the most perfect manner. There are 223 berths in the stateroom of the first cabin and 24 berths in the second cabin.

On the trip out and back, which occupied six hours, the engine performed extremely well. The average number of revolutions per minute—the ship being light—were 15; the average steam pressure, 18 lbs. per square inch, and average vacuum, 28 inches. These are low figures, it must be admitted; but as there was no desire to press the ship to her utmost, they should not be taken as a full test of the powers of the *Morning Star*. From a statement of Mr. John Magin, the veteran pilot, we gather the fact that the vessel proceeded some 16 miles beyond Sandy Hook; assuming this latter point to be 18 miles from the Battery (New York), which, we believe, is the estimated distance, we find that the vessel steamed an aggregate of 68 miles in six hours under very easy steam. There was no opportunity to test the qualities of the *Morning Star* as a sea boat, for Neptune persisted in keeping remarkably quiet during the whole voyage, much to the gratification, no doubt, of those on board who were conscious of being in arrears to the god.

The hospitable owners entertained their guests with a handsome collation on the return trip, at which speeches—complimentary and patriotic—were made, and the passengers separated highly pleased with the ship. A series of resolutions were also composed and adopted, testifying to the skill and good taste of the builders and decorators. The *Morning Star* reached her dock at an early hour in the evening. The sister ship to this vessel, the *Evening Star*, is now at the Allaire Works receiving her engine.

TAXIDERMY—PRESERVING THE SKINS OF QUADRUPEDS, FISH AND INSECTS.

When a quadruped is to be stuffed, after it has been killed and the body become cool, an incision is first made along the stomach sufficiently large to remove the interior parts. The posterior extremities are to be separated at the articulation of the hip-joint and the tail disengaged at the rump. The skin may now be reversed, pulling it towards the head, then separating with it the fore legs from the body at the first joint. The carcase is then to be disengaged from the head at the atlas and removed with the skin. All the flesh must then be scraped from the different bones that remain with the skin, as in the case of birds, and the brain scooped out from the skull. The skin is treated with the arseniated soap in the same way as the skin of a bird. The tongue and eyes have also to be removed and the skin dried before it is ready for stuffing. A piece of strong wire is secured to the skull, then extended back to the tail to supply the place of the spine. The parts of the head are to be stuffed with tow where the flesh has been removed and the artificial eyes put in position. Tow is next wrapped around the wire at the neck to fill it up to its natural size and the skin of the head and neck next arranged. Wires are now thrust up the legs under the skin from the toes and twisted around the wire of the spine. All the vacuities are now filled up with tow until the original proportions of the body of the animal are secured. The object is then fixed on a board with strong wires, and it is pressed and molded into shape with bands of tape, which are retained upon it, until all the parts have acquired a set, otherwise it will get out of shape. When the animal is of large size a frame of wood is usually constructed similar in shape to the object, the skin is cautiously stretched over this and the intervals filled out with tow. It will be understood that the animal is supported on a board, and strong iron wires are used to sustain it in a proper attitude.

A very good preservative for the skins of birds and animals is described on page 76, current volume of the SCIENTIFIC AMERICAN, as having been patented by P. W. Payras, of Paris. It consists of a solution of chloride of zinc of 15° Beaume in strength, to which is added 10 grains of arsenic to every quart. It is applied with a brush to the flesh side of the skin before the latter is hung up to dry. The same care, operations and principles are involved in the stuffing of quadrupeds as in the preparation of birds.

Fish are preserved by dividing each with a scalpel longitudinally and removing the skins with the fins and tail. The contents of the body may also be removed at the mouth and the interior stuffed with tow. The arseniated mixture is applied in all cases. It is to be regretted that the original colors and luster of fish are not retained in preserved specimens.

Insects for preservation should be caught with a pair of forceps or a net. In the case of butterflies care must be exercised not to rub off their finely-colored scales, which are really minute feathers. A drop of a mixture of alcohol and corrosive sublimate upon the head of each soon terminates life. They should be pinned down in rows in a close box covered with glass. The bottom of the box should be coated with a preparation of arseniated soap, as described, or the arsenic and zinc solution. The great object in keeping preserved insects is to prevent predatory living insects, such as ants, from preying upon them. No branch of taxidermy is of more interest than the preservation of insects, and almost every person can practice it on a limited scale. Their brilliant colors and metallic luster delight the eye—they are the gems of the animal kingdom. The brief and necessarily limited directions given are mainly intended to induce persons having opportunities to make collections of natural history and devote some attention to this subject. Amateurs may derive intense pleasure from collecting and preserving beautiful specimens.

Radiation through the Earth's Atmosphere.

A lecture on the above subject lately read before the Royal Institution by Prof. Tyndall, has been published in the London *Mechanics' Magazine*. It contains much original information of an interesting character, and a clear explanation of the reason why dry clear nights are always colder than those which are cloudy. Moisture in the atmosphere is compared to a blanket for preventing the radiation of heat from the surface of the earth, and an explanation is given of the phenomena of heat. He says: "It is well known that our atmosphere is mainly composed of the two elements, oxygen and nitrogen. These elementary atoms may be figured as small spheres scattered thickly in the space which surrounds the earth, and they constitute about 99½ per cent of the atmosphere. Mixed with these atoms we have others of a totally different character; we have the molecules or atomic groups of carbonic acid, ammonia and aqueous vapor. In these substances diverse atoms have coalesced to form little systems of atoms. The molecule of aqueous vapor, for example, consists of two atoms of hydrogen, united to one of oxygen, and they mingle as little triads among the monads of oxygen and nitrogen which constitute the great mass of the atmosphere."

Professor Tyndall also believes that there is a subtile ether pervading all space. He says: "Within our atmosphere exists a second and a finer atmosphere in which the atoms of oxygen and nitrogen hang like suspended grains. This finer atmosphere unites not only atom with atom but star with star; and the light of all suns and of all stars is in reality a kind of music propagated through this interstellar air." The phenomena of heat is attributed to the vibrations of this ether. He says: "We must not only figure our atoms suspended in this medium, but we must figure them vibrating in it. In this motion of the atoms consists what we call their heat. Heat in the body, Locke has perfectly expressed it, is nothing but motion. Well we must figure this motion communicated to the medium in which the atoms swing, and are sent in ripples through it with inconceivable velocity to the bounds of space. Motion in this form, unconnected with ordinary matter, but speeding through the interstellar medium, receives the name of radiant heat; and if competent to excite the nerves of vision, we call it light."

How the waves of radiant heat are intercepted by the moisture in the atmosphere is beautifully described as follows: "The waves of heat speed from our earth through our atmosphere towards space. These dash in their passage against the atoms of oxygen and nitrogen, and against the molecules of aqueous vapor. About three or four years ago, it was discovered by the speaker, that the small amount of aqueous vapor (not quite one-half per cent) in the atmosphere intercepted most of the radiant heat. The drier the air, the more nearly does it approach the character of a vacuum. The aqueous vapor absorbs about 80 times more heat than the pure air. For every 200 atoms of oxygen and nitrogen in the atmosphere there is one of aqueous vapor, and this single atom is 80 times more powerful in absorbing radiant heat than 200 atoms of the air, or comparing atom with atom, 16,000 times. This was a very astonishing result, and excited opposition, based on philosophic reluctance to accept such a result before testing it to the uttermost."

These effects of aqueous moisture were attributed by scientific men to the impurity of London air, to defective apparatus used for trying the experiments, &c.; but Prof. Tyndall states that numerous other experiments have since been made, which have all fully confirmed his conclusions. He states that more than 10 per cent. of the terrestrial radiation from the soil, is usually stopped within ten feet of its surface, and this one fact is sufficient to show the immense influence which this newly-discovered property of aqueous vapors must exert on the phenomena of meteorology. If the aqueous vapor were removed for a single summer night from the atmosphere of England, almost every plant would be destroyed, as the warmth of the fields and gardens would pour itself into space, "and the sun would arise upon an island held fast in the grip of frost." It is the absence of this screen of aqueous vapor and the consequent copious waste of heat that causes mountains to become so cold after sunset. Its absence in Central Asia renders the winter there almost unendurable.

The Machine called the "Devil."

The machine called the "Devil," intended for the removal of obstructions in Charleston harbor, drifted ashore in the late attack on that place and was captured by the enemy. Appended is a description of the machine:—An iron frame, floated to the water's edge by iron sponsons, is pushed ahead of the *Monitor* as she runs in. Its length from the bow of the *Monitor*, is from 20 to 30 feet. An aperture is made next to the vessel of the shape of her bows, intended to receive it. The breadth of the "Obstruction-remover," as it is called, is 12 feet. From each side of the forward extremity a strong iron bar runs down also 12 feet, the *Monitor* drawing but from 8 to 10 feet of water, thus rendering it impossible for any torpedoes over which this "Obstruction-remover" passes to injure the vessel. A number of iron bars are used, not only to form a net-work so as to either push forward or explode every torpedo less than twelve feet under water, but also to steady and strengthen the masts. At the bottom a heavy tie-bar unites these two vertical rods, upon which rests the percussion torpedo containing seven hundred pounds of powder. Above this is a hammer which catches in a spring so stiff as to require two men to set it, but constructed so that the lever which protrudes in front, forming the handle or other end of the hammer, will cause the spring to yield with little pressure.

A WORD OF CAUTION ABOUT MODELS.—Models are frequently received at the office from sources wholly unknown to us, simply because the inventors have neglected to attach their names and post-office addresses to them. If an inventor has not the means at hand to paint his name on the model, let him write it on with pen and ink, or tie on a piece of paper with the address written upon it; there are many ways of doing it, and if done it will often save delay and trouble.

THE London *Mechanics' Magazine* states that a remedy for the poison of strychnine and mushrooms has been discovered, and consists in making a poisoned person eat large quantities of refined sugar, and in desperate cases opening a vein and injecting water in which sugar has been dissolved.

A FRENCH writer calls dyspepsia the remorse of a guilty stomach.

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HINTS FOR HOUSEKEEPERS.

Poisons and Antidotes.—The antidote of a poison is that which renders it instantly harmless; this it does by converting the elements or ingredients of the poison into new compounds, which are wholly innocuous. But in all these cases, the benefits to be derived from the employment of an antidote are proportioned to the instantaneousness of the application; the importance of this is very generally understood, but the event deprives friends of all presence of mind; they are thrown into such a flurry as to be incapable of connected thought or efficient action. It may, therefore, save many a human life if the reader will impress upon his mind two or three general principles. It is true that "every bane has its antidote," but as there are hundreds of poisons, and the memory would be overtaxed with an antidote for each, it is agreeable to note that some substances are perfect antidotes against a dozen poisons; and it is fortunate, too, that these substances are almost always at hand, even in the poorest households. Strong coffee; salt and mustard; white of eggs; any kind of domestic oil, lard or grease—these four things antagonize almost all ordinary poisons. If the reader will bear this in mind, he can be happily and efficiently calm, under almost any circumstances of poison in which he is likely to be placed. 1. Prevention is best. No poisonous substance should be allowed in any household for one single instant, after it is out of the hand; whatever has been left after use, should be at once thrown into the sink or carried out into the street or road, broken, poured out or scattered. 2. The very moment you see any thing in a paper or bottle or other vessel, without a mark showing what it is, empty it without a moment's delay into the sink; this is safer than throwing it into the fire, for it may be inflammable or explosive and cause much mischief. 3. Never take, taste, or give any thing, whether powder or fluid, in the dark, or without looking deliberately at the label, in a clear light, although you may have put the vessel or paper down with your own hand, a minute before. But from inattention, recklessness, or design, poisons will sometimes be swallowed, and the truly wise will inform themselves beforehand, as to the best means of procedure. First, send for a physician. Meanwhile, remember that the effect of administered poison is instantaneous, or comes on slowly. If instantaneous, the patient immediately cries out with the sensation of heat or burning, or scalding at any point from the mouth to the stomach; the presumption then is, that some corrosive poison has been taken—something which eats or destroys or disorganizes the muscles or fleshy parts of the tongue, mouth, throat, stomach, &c. Most poisonous substances of this sort are acids, and the first best remedy likely to be at hand is common soap dissolved in water, or soda or saleratus or magnesia; but in the hurry of inexpert hands the remedy may be made so strong as to become of itself another poison, hence it is best to take the simplest thing which is most likely to be at hand, and which cannot injure in any quantity or strength in which it can be taken; hence for poisons which cause an instantaneous sensation of burning in the throat, &c., drink a tea-cupful of sweet oil or lard, or grease of any sort; the most that can happen from an over-amount is that it will be vomited up, and this brings more or less of the poison out of the stomach. Then you can more leisurely drink magnesia-water or strong soap-suds, or a table-spoonful of wood ashes put in half a pint of lukewarm water, stir, let it settle two minutes, pour it off and drink. If a powder has caused the urgent sensations, the most generally-applicable antidote is to swallow one or two raw eggs; the white is the efficient part, but there may not be time to separate the yolk; this is best in poisons from arsenic, corrosive sublimate, verdigris, creosote, &c. If the effect is not instantaneous, and time may be taken, the first best thing to be done in all cases is to get the poison out of the stomach instantly, by swallowing every five minutes a tea-cupful of warm water into which has been stirred a full tea-spoon each of common salt and ground kitchen mustard; there is vomiting almost as soon as it reaches the stomach; then drink a cup or two of very strong coffee, which is the best remedy for all anodyne poisons, as opium, morphine, laudanum, &c., &c. In short, if the sufferings are instantaneous and urgent, drink sweet oil or soap-suds; if gradual or causing drowsiness, mustard emetic, strong coffee or white of eggs.—*Hall's Journal of Health.*

Coffee Poisons.—If it be true that there are men so lost to all moral principle as to deliberately put strychnine and other poisonous drugs into liquid compounds, and then sell them for Bourbon whisky or French brandy, there are others who will adulterate coffee for the sake of gain, and sell it as a pure article. There are two very certain methods of avoiding imposition: either drink no coffee at all, or purchase the berry and burn and grind it yourself. It is claimed that several families have been poisoned in Brooklyn by drinking what was sold for pure rye coffee. Ergot of rye is certainly one of the most deadly poisons, and the city grocer may have been imposed upon by some careless farmer, who did not clean his grain properly. Those who are so lazy or thriftless as to purchase ground coffee to save themselves the trouble of preparing it at home, deserve to be poisoned—a little; but as it may be necessary sometimes to do so in an emergency, it is well to know that if ground coffee is pure, it very slowly discolors cold water, and is also slow to soften; but most adulterations blacken the water at once, and become soft besides. Of thirty-four samples of city-sold coffee of all kinds, thirty-one were found to be more or less adulterated. "Chicory," or succory, is a garden endive, and is extensively used as coffee by the poorer classes; costing, in its parched and ground state, only fifteen cents a pound. It is simply the root of an herbaceous plant sliced, dried, parched and ground; it is one of the "drugs" of the apothecary, and is spoken of, in medical dispensatories, as a "tonic;" as a "deobstruent;" as "acting on the liver;" it is said by some to impair digestion; to cause dyspepsia and bring on headaches, &c. The safer plan for all who wish to economize, and think they must have some kind of coffee for breakfast, is to use burnt bread-crust, or the common carrot prepared like chicory. Many think they cannot do without something to drink at regular meals, but this is a mere habit; if it must be done, it should be something quite warm, almost hot, because it is known by actual ocular demonstration, that cold water or any other cold liquid introduced into the stomach at meals, as instantly arrests the process of digestion as water extinguishes a live coal; cold milk at meals has the additional disadvantage, if used freely, of engendering constipation, biliousness and the long list of minor symptoms which inevitably follow those conditions. But large draughts of even warm drinks at regular meal-times are very pernicious; as they not only cause "oppression," but by largely diluting the fluids which nature has prepared for converting the food into a nutrient material, render them less efficient, impose additional labor on the stomach and prematurely exhaust its powers. No one should exceed half a pint of liquid at any meal; invalids and the sedentary should use habitually still less.—*Hall's Journal of Health.*

Curing Butter.

At the commencement of the grazing season, those who have large dairy farms, as well as those farmers who make moderate quantities of butter, should adopt such methods of making it as will insure the very best qualities. A correspondent of the *Canadian Agriculturist* states that the following is the method of treating butter in the west of Scotland. He says:—

"Whenever the butter is made in the churn, it is removed from the butter-milk, and washed in at least three or four changes of cold spring water. If the butter is very soft, and the weather hot, it should be allowed to lie for ten minutes or so in the cold water, to harden, before it is much beaten; after this it must be carefully kneaded with the skimming dish, till every particle of buttermilk is expelled; after which, and while the butter is yet soft, it ought to be salted. The quantity of salt for butter intended for keeping several months, as used by the Ayrshire dairymen, is half an ounce of salt mixed with ten drachms of refined sugar, and ten drachms of niter to every sixteen ounces of fresh butter. The sugar improves the taste, and the niter gives the butter a better color, while both of them act with the salt in preserving the butter from rancidity. Both the sugar and niter should, however, be use with great caution, and should not exceed the quantity stated above, otherwise the butter acquires a peculiar disagreeable taste. The whole three ingredients are well mixed together and ground or pounded very fine. In curing, the salt is minutely mixed, if not, the parts that missed the salt will be white, and the other parts yellow. But although it is necessary that the salt, &c., be carefully kneaded through the butter, care must be taken not to bake or knead it too much, otherwise it gets into a state like putty, and becomes tough and gluey. The great point is cleanliness. Extreme attention should be given to the scalding and scouring of the coolers, vats, churns, &c., as without this, however good the management in curing and packing, the butter will have a strong taste, and consequently be of inferior quality. It is also necessary to keep the cured butter in a cool airy place; the outside of the kegs should be kept dry and clean, as a great deal depends on appearance in getting a price; if the temperature of the store can be kept low by keeping ice in it, all the better."

"The American Agriculturist."

This periodical for the current month contains many practical suggestions on topics interesting to a large portion of the community. It is difficult to conceive how the table of contents could be more varied or comprehensive than they are. The farm, the garden, and the household, are all touched and treated upon in the various articles, and the editor finds time as well to say a few words to the little ones, which are doubtless highly appreciated by them. We notice a very spirited engraving of a "team afield," ploughing up the prairie, and also a representation of the flying foxes of Ceylon in the April number. The different varieties of plants and vegetables introduced, receive attention from the hand of the artist; and the appeal to the eye by the engraving, and to the mind by the explanations which accompany them, must result in producing a vivid idea of the good qualities of the particular vegetable or grain under discussion. The *American Agriculturist* is doing a good service by exposing bogus firms and humbugs generally, and we cannot omit the opportunity to avail ourselves of its latest discovery in this line:—

A Few of the Humbugs.—A good many men advertise for agents at $50, $60, and $75 a month, and "all expenses paid." When replied to, they forward plausible circulars advising you to send them certain sums of money for sample sewing machines, or other articles, on which they offer great profits if you undertake the sale of them. If you ever get any return for the money, which is seldom the case, you are told that if you sell a certain amount you can make $60, $70, or more. Certain parties in this city and elsewhere send out one, two, or three copies of a professedly agricultural journal, and offer great inducements to postmasters and others to get up clubs. They get many to send in money, and sometimes pay the premiums, such as they are; but the paper soon stops, and the duped subscribers can get nothing more for their money, and no amount of writing will draw out a word of reply from the nominal publishers. They write to a friend in the city to call and inquire about it, but the reputed publisher is always out of town, or sick—at least he can never be found.

Care of Harness.—T. Oliver Ayres, a practical harness maker, in Kent county, Del., contributes to the *American Agriculturist* the following suggestions:—"Harness should be kept hung up on wooden pegs in a clean dry room with a plank floor, so that it may be free from dampness. When soiled, it should be washed with Castile soap-suds. Harness that is in constant use needs oiling four times a year; if only occasionally brought out, as carriage harness, &c., twice a year will be sufficient, if the washing be not neglected. To oil harness, separate all the pieces, and lay them in water until thoroughly wet through. Then wash them clean, and allow them to dry sufficiently. To know when they are in good condition for oiling, bend a strap, and if the water does not ooze, it is dry enough. Train oil (whale oil) is sometimes used, but neats-foot oil is much better. Mix with it a little lamp-black, and with a brush apply it to both sides of the straps. About six hours after oiling, wash the whole with Castile

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soap and warm water, let them dry, rub well with a woolen cloth, and buckle them together."

RABBITS IN THE ORCHARD AND NURSERY.—A correspondent of the *American Agriculturist* says that rabbits may be kept from young trees by greasing the trunk for about two feet from the ground. He uses either fresh lard or the fat of a rabbit.

City Sewage for Farms.

One of the celebrated farmers of England is Alderman Mechi of London. His fame has been extended far and wide for the enterprise he has exhibited in adopting the most improved implements and in making experiments to test new modes of improving farms. He lately read a paper before the London Farmer's Club, on "Town Sewage," from which we make the following condensed extracts, which will show the style in which farming is conducted in some parts of England. He said :—

"I think we are all agreed that the great want of British agriculture is more manure. On this point there is a remarkable unanimity among farmers. We may over-manure for our cereals, but never for our pastures—rye-grass, green, root, and leguminous crops. It is impossible to take a railway trip through almost any district of the United Kingdom without being convinced that it is only half-manured, and that its powers of production might be greatly increased. The use of town sewage will render less necessary the purchase of guano and artificial manures, and it will diminish the necessity for purchasing foreign feeding stuffs as a source of manure. This is a very important consideration, for I know one Norfolk farmer who pays £3,000 annually for linseed-cake alone ; and another who, during his holding, has paid £70,000 for cake and £50,000 for artificial manures, being equal to £100 per acre over his whole farm. The once sandy wastes on the seashore near Edinburgh, not then worth 5s. per acre, now produce an annual income of from £20 to £30 per acre, solely by the application of town sewage. By large applications of sewage the crops of grasses (and consequently of milk, butter, cheese, meat, and manure), may be increased from three to six fold and upwards, according to soil. Now, supposing that a tenant has a long lease of a suitable farm, it is quite clear that his present rent, chargeable against each tun of produce grown on the sewaged land, will be gradually diminished from 25 to 70 or 80 per cent. But there is this enormous additional advantage, that, having four times as much manure from the produce of the sewaged soil, he will be enabled to grow much heavier crops on the other parts of his farm unsewaged, and thus increase the profits over the whole of his farm. Taking the cost of consumable products (liquid and solid) used by the thirty millions of our population at £9 a head, or £270,000,0000, and taking the excrementious residue of such consumption at the very low estimate of one-tenth of the cost of the articles consumed, we should have as a result an excretal value of £27,000,000. Seeing that more than one-third of our population live in towns, we may reasonably ask, is it not an act of folly, and a gross commercial error, to waste such a treasure, instead of availing ourselves of it to fertilize our soil, and cheapen and increase our food? We paid for foreign produce £76,000,000, in the year 1861. Ought not the excretal result of such an enormous importation to have greatly fertilized our soil? In London alone the horses consume 30,000 quarters of oats per week, and hay in proportion.

Artificial Butter.

We have some hesitation in publishing the following information, lest some enterprising Yankee takes it into his head to "institute a series of experiments on the subject." Some of the butter sold in this market at the present time would appear to have gone through some such process as described below. A writer in a London periodical says :—

Cream is a very delicious food, yet it is only the fatty substance of the cow with a peculiar flavor superadded. If our chemists can take the whole fat of the cow, after slaughter, and add to it an artificial flavor, and thus convert it into an artificial cream, it will surely be a great gain. There is little doubt that a large amount of London butter is manufactured artificially, but the objection is, that it is a very bad and unpleasant imitation of natural butter.

The present writer was riding behind an engine on a railway, a short time back, when there stole on him a strong odor of red herring.

"Why, guard, is the driver cooking his breakfast at the fire-box door?"

"No, sir ; that is where it comes from," pointing to a huge factory on the left of the road.

"What are they doing there?"

"Melting down fat."

"For the candle-makers?"

"No, sir ; for Dutch butter."

"What fat is it?"

"Oh, they pretend it's all 'flares ;' but they put in old grease of any kind—old railway grease and bone-fat."

"But why for Dutch butter?"

"Because they can't make it into butter here, as Dr. Letheby and Dr. Hassall would be 'down' upon them. So they send the fat over to Holland ready melted, and make it into butter there, and send it back here, when nobody can say anything against it. But, sir, I am told they use arsenic in purifying that fat, and if they don't get it all out before they make butter of it, all the worse for the poor who eat it."

If the English manufacturers produce edible and nourishing fat from waste and other materials, and Dutch chemists so flavor it that it tastes like butter, and the effect on digestion is the same, there is no apparent harm in the process. But it would be well, nevertheless, that it should pass through the crucibles of the English chemists before passing into the stomachs of the English poor.

VALUABLE RECEIPTS.

REMEDY AGAINST MOTHS.—One ounce of gum camphor and one ounce of powdered red pepper are macerated in 8 ounces of strong alcohol for several days, then strained. With this tincture the furs or cloths are sprinkled over and then rolled up in sheets. Instead of the pepper, bitter apples may be used. This remedy is used in Russia under the name of the Chinese tincture for moths.

MUSHROOM KETCHUP.—First clean the mushrooms from all extraneous matter and use none that have the least appearance of decomposition. Now cut them in slices and salted place them upon a colander and squeeze out the juice gently. This juice is then left for a few hours, and after being decanted carefully from any sediment, placed in small bottles, room having been left for a little alcohol in which the proper spices have been previously steeped. This is said to keep admirably and to retain its full aroma, which is apt to pass off in the process of long-continued fermentation or boiling by which common ketchup is made. The true mushroom of our pastures, and those varieties which afford a red juice when bruised, are far the best. The ketchup merchants frequently keep the mushrooms salted down in casks for months before they are converted into ketchup. In general, however, the more rapidly the juice is extracted, the better is the produce and the more likely to keep.

TO COAT IRON WITH BRASS.—There are two processes by which this operation may be accomplished. One is to cleanse the surface of the iron perfectly from grease and oxide, and then to plunge it into melted brass. The cleansing is best done first with a lye of soda or potash and water ; then placing the iron for a short time in weak sulphuric acid and water, the metal being bright, it may then be dipped into the fluid brass, and the thin coating of brass thus adhering to the iron is afterwards polished and burnished. The electrotyping process is, however, now mostly adopted by manufacturers. A solution of brass is first made thus :—Three quarters of a pound of cyanide of potassium, one and a half ounces of cyanide of copper and three quarters of an ounce of cyanide of zinc, dissolved in one gallon of clear rain water, to which finally add one and a half ounce of muriate of ammonia (sal-ammoniac). This liquid is then to be used hot (not scalding, say 180° Fah,) in this manner : the iron to be coated is attached or connected with the zinc end of a battery of moderate power, and a piece of good brass is fastened in like manner to the opposite pole ; both the metals are then to be immersed in the hot brassy solution and there left undisturbed for such time as is deemed necessary, and the iron will become coated with brass of a thickness according to the time it is left in the solution. Burnishing and polishing are afterwards required, according to the particular nature of the work. The texture and tone of color of the brass vary with the temperature of the solution and quantity of the materials employed, &c. By a small jet of gas or other contrivance the liquid must be kept hot during the whole process.

TOOTH POWDER.—Calcined bread or sugar reduced to fine dust is an excellent tooth powder. It cleanses the mouth mechanically and chemically. It is more easily miscible with water when mixed with prepared chalk, hence it is preferable thus to mix it. It may be scented with a few drops of the oil of cinnamon. At the expense of a few cents as much good tooth powder can thus be prepared by any person as those preparations of tooth powder which sell at the rate of twenty-five cents for a small box full.

INDELIBLE INK FOR LABELS ON BOTTLES CONTAINING ACIDS.—Take oil of lavender, 200 grains ; gum copal in powder, 25 grains ; and lamp-black, 3 grains. Dissolve the copal in the oil of lavender contained in a phial, by the aid of gentle heat, then mix the lamp-black with the solution by trituration in a porcelain mortar. If too thick add a little turpentine. This is an indelible black ink. To make a red ink of the same quality add vermilion to the copal solution. Amber varnish ground with lamp-black makes a good black ink also ; if colored with vermilion it makes a red ink. Such inks dry very slowly.

The Production of Instantaneous Photographs on Large Plates.

The following is the substance of a paper lately read on the above-named subject before the London Photographic Society, by Lieutenant-Colonel Stuart Wortley, and published in the *Photographic News* :—

"First it is absolutely necessary to have clean plates, both for the sake of avoiding marks in the original negative and to guard as much as possible against loosening of the film during the intensification. The collodion I have been in the habit of using is very alcoholic, the following being the proportions :—Ether, 1 ounce ; alcohol (802), 2½ ounces ; iodide of lithium, 15 grains ; bromide of lithium, 6½ grains ; or rather more than double alcohol to ether, between 4 and 5 grains of iodide and 2 grains of bromide to the ounce of collodion. The pyroxyline is first steeped in the iodo-bromized alcohol, and the ether then added. The quantity of collodion varies very much in different samples. I thus obtain a very fluid collodion, which I find a great advantage in coating large plates where a very even film is required, and in all instantaneous pictures where there is much sky.

"The utmost precautions must be used to avoid streaks, spots, or stains of any kind. This is one of the great difficulties of working out of doors. I have lost many good negatives by accidental spots from dust and such unavoidable causes.

"The silver bath is made from pure re-crystallized nitrate of silver, 35 grains to the ounce. I iodize by leaving a couple of coated plates in the bath for several hours. I then find it necessary to add from two to three drops of pure nitric acid to the ounce of bath. The more bromide in the collodion, the more nitric acid, I find, is required in the bath. I leave the plate rather longer in the bath than I should if I was using simply iodized collodion, as I find the maximum of sensitiveness takes longer to produce with a collodion containing much bromide than with a simply iodized or lightly bromized collodion. I drain very carefully, and place blotting paper all along the bottom of the plate when in the slide.

"My pictures in the Exhibition are taken with Dallmeyer's triplet lenses, and usually with full aperture—necessarily so when facing the sun, as any diaphragm in the lens produces rings on the plate, when the sun shines into the lens.

"My developer I make as follows :—Sulphate of iron, 20 ounces ; distilled water, 120 ounces ; acetate of lead, ½ ounce ; water, 5 ounces. Mix these solutions, and when the precipitate has all settled, decant off very carefully. Add :—Formic acid, 5 ounces ; acetic ether, 1½ ounces ; nitric ether, 1½ ounces. This I keep as a stock solution, and filter off as much as I require for use at a time, adding

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acetic acid in proportion, according to the temperature of the weather and the class of picture required. The developer should move freely over the plate, and should remain on the plate some seconds before any sign of the picture appears. As the acid loses its restraining power, the iron acts, and the result is a simultaneous action over the whole plate, and the picture flashes out all at once! The developer is a very powerful one, and I use a very liberal amount of acetic acid as a restraint to the energetic action of the iron and formic acid.

"I keep the developer on the film till I have obtained the necessary detail, and then, washing the plate very thoroughly, bring it home in a grooved box, to be fixed in the evening with a weak solution of cyanide of potassium. Many of my negatives were taken in Italy, and brought home, after fixing, for the intensification to be done in England. The edges of the plate must be carefully varnished, and the film moistened with distilled water. A saturated solution of bichloride of mercury is then poured on, and poured off as soon as the film has taken the proper color, on which, after a good washing, a five grain solution of iodide of ammonium in water is poured on and off till the desired depth is attained. I then use two solutions composed as follows:—1. Pyrogallic acid, 12 grains; water, 1 ounce. 2. Citric acid, 50 grains; nitrate of silver, 10 grains; water, 1 ounce. Pour a few drops of No. 2 into No. 1, and pour on and off. The negative can now be made to assume any depth you may require.

"If you have a negative from which you desire to print vignettes, keep the negative tolerably transparent. If you intend to print your negative to the edges, see that it has force conjoined with softness. Many a negative, which is too transparent to give an effective print if printed to the edges, will give a beautiful vignette.

"Every one should print from his own negatives. Taste and knowledge are shown as much in the printing as in the production of the negative. Many amateurs who produce moderate negatives send them to professional photographers to print, and thus obtain the taste and talent of another man in the production of the pictures, which they then speak of as their own. This is not, in my opinion, at all right, as the printer certainly deserves to share the credit of the finished picture.

"I use, for printing, a silver bath of 100 grains to the ounce of water, acidified with citric acid; and use as toning-bath a solution of chloride of gold and phosphate of soda, of which I keep a large quantity in stock, and prefer to use it some weeks old. I *fix* in fresh hyposulphite of soda, and mount the finished picture with fresh starch."

The Colors of Nature.

He who exhibited such matchless skill in the organization of material bodies, and such exquisite taste in their formation, has superadded that etherial beauty which enhances their permanent qualities, and presents them to us in the ever-varying character of the spectrum. Without this the foliage of vegetable life might have filled the eye and fostered the fruit which it veils, but the youthful green of its spring would have been blended with the dying yellow of its autumn. If the objects of the material world had been illuminated with white light, all the particles of which possess the same degree of refrangibility, and were equally acted upon by the bodies on which they fall, all nature would shine with a leaden hue, and all the combinations of external objects, all the features of the human countenance would have exhibited no other variety than that which they possess in a pencil sketch or a China ink drawing. The rainbow itself would have dwindled into a narrow arch of white light, the stars would have shone through a grey sky, and the mantle of a wintry twilight would have replaced the golden vesture of the rising and setting sun.—*Sir David Brewster.*

THE SEA A GREAT CEMETERY.—The sea is the largest of cemeteries and its slumberers sleep without a monument. All other graveyards, in all lands, show some symbol of distinction between the great and the small, the rich and the poor; but in that ocean-cemetery, the king and the clown, the prince and the peasant, are alike undistinguished.

Correspondence

Experience of a "Perpetual-Motion" Seeker.

MESSRS. EDITORS:—As there seems to be a class of people who will persist in trying to invent a "perpetual motion," I wish to state a few facts for their perusal, as I have spent time and money enough to make me competent to advise this class of inventors.

At the age of ten years I made my first attempt at making a "perpetual motion." I was certain it would go, and so far as could be seen, without a trial, it seemed admirably adapted to the intended purpose, but on putting this to real use the only imperfection consisted in a stubborn refusal to do any part of the work intended. Now, a thorough knowledge of and belief in the laws of motion and the principles of mechanics would have prevented the loss of my time and money; but I learned by experience the impossibility of perverting the laws of nature or mechanics.

I soon learned that the simpler my machines were, the more likely I should be to succeed, and at last I found the best arrangement to consist of a simple lever, with the fulcrum in the center and equal weights at each end. This was at once the nearest to "perpetual motion" and the furthest from it.

Some are carried away with the idea that machinery can be arranged so as to gain power; this is a great mistake, as there can be no gain. The starting point is the reservoir of power; the further you are from that point, the less the power. Suppose I wish to raise 1,000 tuns one foot. I could raise it with one pound, but suppose I have one tun to raise it with, the simplest arrangement would be a lever. This is the simplest kind of mechanical power, and works with the least friction. Then, as the power, multiplied by the space through which it moves in a vertical direction, must be equal to the weight multiplied by the space through which it moves in vertical direction, the power (1 tun) must fall a fraction over 1,000 feet to raise the weight (1,000 tuns) 1 foot. Now, to make this a "perpetual motion" the 1,000 tuns must raise the 1 tun back to its first position. The lever is the best arrangement but that will not do it; then you may try the second, third, fourth, fifth and sixth mechanical powers—none of these will bring the weight as near its first position as the simple lever; then you may arrange six mechanical powers in one machine, and it will not bring the weight as near its first position as either of the above arrangements separately.

Next the "perpetual-motion" seeker views the broad fields of hydrostatics and hydraulics. The first thing that meets his gaze is a bright sparkling light; this must certainly be the long-sought-for treasure; he hastens on, regardless of every thing else, picks up that diamond—the hydrostatic paradox; this must be set in the golden frame of "perpetual motion," and the inventor commences his work. Money could not buy his idea, he at least will live to see Science crown him as her king. Air castles are building much faster than his machine. At last the finishing touch is given, when—look, what can this mean?—the diamond that sparkled so brilliantly one moment since is as dull as lead! What can it mean? Simply this: the inventor has interposed his setting between the light from the laws of science, and the brilliancy is gone; let him place it where he found it, and he will perceive that he has commenced at the wrong point. The attraction was the light, the unmistakable workings of certain fixed laws acting on inanimate bodies. All seekers of "perpetual motion" are simply turned around. Instead of studying the nature of those laws which are the source of scientific light, they turn their backs upon them.

I have invented cunning machines which seemed to contain such a peculiar arrangement of principles as would warp and bend the laws of nature so completely to my will as to cheat nature of her dues. I have tried every element, made as many different arrangements and combinations as I could conceive of, yet with the same results, and I have long since given the thing up.

I noticed in a recent number of the SCIENTIFIC AMERICAN a communication from a "perpetual-motion" seeker, wishing to know if you had a standing offer, &c. I will give any amount for a satisfactory one, but would advise all attempting the thing to make some practical use of their talents, as there are thousands of improvements yet to be made. Invention is yet in its cradle.

L. C. CROWELL,
187 Salem street, Boston, Mass., April 13, 1863.

Flax Treatment.

MESSRS. EDITORS:—I have filed in the Patent Office, through the Scientific American Patent Agency, a caveat for preparing flax for manufacturing without the intervention of the heckle. The process consists in forming the material into a rove either by means of the carding machine or by drawing rollers and subjecting the same to a rubbing action through revolving and vibrating rollers. This application of friction, transversely of the fibers, is found to accomplish the same result as friction applied longitudinally through the medium of the heckle, but with greater thoroughness and rapidity. It effectually removes the glutinous or incrusting matter which binds the fibers together, and leaves the latter in a condition to be subdivided to any extent required, only limited by the divisible capacity of the fibers themselves. The process is applicable alike to unrotted, dew-rotted or water-rotted flax, either in a tangled or straight condition. This method of preparing flax would seem to apply better to the unrotted than the rotted article. from the fact that in the former the glutinous matter is of a more friable character and is of course more easily removed by friction. In the process of rotting the gelatinous matter is dissolved and attaches to the fiber with great tenacity, requiring additional labor to undo that which should not have been done. Unrotted flax does not possess that continuity that characterizes the rotted article, yet it acquires that property on being immersed for a short time in tepid water; it may be so immersed either in the form of yarn or after they have been fabricated.

From the want of continuity in the unrotted flax it is easily stranded, and if, after it has been formed into a sliver, it could be stranded into lengths not exceeding one inch, it might be spun on the cotton throstle with the same facility as cotton.

This method of refining flax, by a process wholly mechanical, should forever do away with all attempts towards producing a substitute through the costly, tedious and contaminating agency of chemists. The celebrated article of flax-cotton, that has so often startled the manufacturers of the present age, can be more readily and economically produced by the rubbing rollers and cards, and of better quality as regards purity of strength and adaptation for manufacturing, than was ever produced by any of the complicated chemical processes observed by Claussen, Knowles or Allen. The manufacturer of cotton does not undertake the blighting effect of bleaching its fiber before spinning, and surely the manufacturer of flax would profit by coming to the same determination.

Since the introduction of the very efficient flax brake, patented by Mallory & Sandford, of New York, which operates equally well on unrotted or rotted flax, the farmer may safely increase the production of flax straw, with the certainty of finding a demand at satisfactory prices.

Let the above suggestions be practically carried out. Let the same attention be given to the staple of flax, in its crude condition, as has been given to the rotted or chemically prepared, and we may yet succeed in dethroning the great King Cotton.

JAMES ANDERSON.
Louisville, Ky., April 6, 1863.

The Trees and Skies of California.

MESSRS. EDITORS.—In the SCIENTIFIC AMERICAN, on page 214, current volume, I notice an account of a tree assumed to be over six thousand years old from the number of rings it contained. But I think another inference may be drawn from the presence of those rings, and that is the fruitful or unfruitful seasons. In the summer of 1835 I resided in the country and worked in wood, and hence had an opportunity to discover some facts connected with this subject. The timber I worked upon was white or soft maple, of large grain, which I sawed into short blocks to rive into small sieve hoops. I observed a remarkable difference in the size of the grains, and

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on counting them from the exterior inwardly, found that those formed in 1824 and 1816 were quite small. Those years, I remembered, were very cold and unproductive, especially the latter, in which frost occurred each month, causing the failure of many crops, particularly in Massachusetts, my native State; I had been informed that the same was the case in Bucks county, Pa., where I then sojourned. I found this view to be correct in other instances so far as I could make a comparison at that time, but since then I have had no further opportunity of applying the test. It would be worth while, I think, for others having better opportunities than I, to study out this matter, especially your California correspondent upon the patriarchal trees; these would carry him back to the seven years' famine in Egypt, in the time of Joseph, whereby he might prove the historical statement, and also establish more exact chronological data. In speaking of trees, I am reminded that another Californian has set up a claim for the special splendor of the skies on the Pacific coast. I grant them their big trees, gold mines, and many other wonders, but will never submit to have Massachusetts deprived of her glory of the heavens. Here are a few lines descriptive of the celestial glories of the old Bay State :—

" Now Hubert sought the smooth descending road,
While Phebus lent his last declining ray.
But e'er he reached his father's blessed abode
He saw refulgent-amber crown the day,
O'er which the burnished clouds pursued their way.
Thine own, Columbia, was that autumn eve,
Whose robe would shame all regal pomp away.
In vain may slaves their gorgeous damask weave,
No art can vie in tints which thy own skies receive!

M. W. Hammond.

Philadelphia, April 7, 1863.

Frictional Gearing.

Messrs. Editors :—Allow me to give you my experience in regard to frictional, or smooth-faced gear, ing. In the winter of 1859-60, while superintending the building of the Bellevue (Ohio) flouring mills, I thought I would try the smooth-faced gearing for driving what is termed a wheat-receiving elevator. The work of said elevator, at times, was to raise three or four hundred bushels of wheat per hour to the hight of sixty feet for storage. The wheels worked so well that I was induced to try them in several other mills for the same or similar purposes, and I always met with perfect success. If I were to build a flouring mill for my own use, I would unhesitatingly adopt the smooth-faced gearing in preference to any other method of communicating power to the machinery. In the above experiments I used cast-iron wheels twenty-five inches in diameter, six-inch face, turned off perfectly smooth ; while they are at work they run thirty-eight revolutions per minute.

J. C. Waggoner.

St. Louis, Mo., April 9, 1863.

[Our correspondent's details are not as full as we could wish. It has been asserted that a friction pinion would not drive a friction wheel, except at a tremendous loss by absorption of power. We have never seen any statements as to the truth or incorrectness of this theory applied practically, and should like to hear from some one who has tried the experiment.—Eds.

A Successful Rat-catcher.

Messrs. Editors :—I have been a regular subscriber to the Scientific American for the last two years and in that time I have gained at least ten times as much in valuable information from the receipts appearing in its columns, as the price of the subscription is worth. I consider it the very best paper in the Union. I will here mention my success with the novel barrel trap, with slits, for catching rats, which appeared in your paper. I proceeded exactly in the manner set forth—feeding them on the top for five days, and cutting slits at right angles on the sixth day. On the first night I caught thirteen rats, and nine on each of the two succeeding nights, making altogether thirty-one rats in three nights. This beats any rat trap I ever heard of. In closing I will again say that I consider your paper the very best of the kind in the Union, and I shall continue to take it as long as I have a cent to expend.

Lewis Schmidt.

St. Louis, Mo., April 6, 1863.

[We consider the trap in question a very excellent one. An illustration of it may be found on page 400, Vol. VII., (new series) of the Scientific American. Those afflicted with rats should not fail to use it.—Eds.

Observations on the Invisible Forces that affect Matter.

When the bodies around us change in form or in color or volume, it is usually assumed that they are acted upon by some matter so subtle as to be beyond the cognizance of the senses, and, as solids are soluble in water, so we assume by analogy that this invisible agent is also a fluid; and the general method of reasoning is founded on this assumption. Starting with such a conception, when changes in form, color and volume occur in a body at one and the same time, these are assumed to proceed from various fluids, each of which is acting upon the body affected ; or else that the action of one fluid disturbs the equilibrium of several others—termed the electric, magnetic, galvanic, &c. When the changes are so complicated that the same results ensue from the effect of fluids that were at first considered independent and distinct in their nature, such as when a galvanic current, a flash of lightning or a hot fire alike melt a wire, then these fluids are classed as so closely allied and so related to each other as to appear to be interchangeable in some way not yet understood. And this view is strengthened by the discovery of a definite relation between heat and power and by the application of Joule's equivalent. The language now in general use implies a theory that the subtle fluids are in some way a modification of one cause, and that this fluid may be either something so very etherial as to be imperceptible to the senses or else some other form of matter too vague for our direct examination and only to be studied by its effects on other bodies.

Let us assume that there is one cause only for the various phenomena termed magnetic, electric, &c., and, in order to familiarize the mind with a view of referring various simultaneous changes in an object to a single cause, let us consider what occurs when a piece of iron is heated and becomes luminous—swelling in size and hissing when water is poured upon it. Under the present view it is said that caloric from the fire has permeated the iron and caused it to change in volume and to hiss when water is put upon it ; also, that light radiates from it ; whilst, should it be magnetic, a third agent is called into action. Assuming a single cause for these results it will be expressed as follows :—A change is going on in the iron which is perceptible to the eye in color, to the sense of feeling in the warmth or temperature and to the ear in its sound. Thus the senses each in its channel inform us that a change is going on without pointing out any number of causes for that change, so that we may refer the variety of effects perceived rather to our various methods of observation through the channels of the different senses than to a number of causes—as many as there are senses to perceive them. As when a piece of metal is melted and volatized, we do not seek for one cause of the change of weight and another for the change of form ; but, because there are two methods of observing the change, we consider one cause, viz., caloric, sufficient to account for both the melting and volatization. So the various changes of form, color and other properties of a body may be viewed as proceeding from one cause and affecting the different senses simultaneously. But if this invisible agent be not a fluid, what can be pointed out as the one cause of so many diversified changes—what shows itself sometimes in motion with heat or with light or sound and sometimes in motion without any effect upon the senses, except in the changes of form that result from its action ? There is one peculiarity which may aid in furnishing a solution, which is that motion ensues whenever the resistance of the matter acted upon is equalled by the force attacking it, so that the imponderable seems to be subject to the laws of mechanics, and all the changes that occur may be viewed as the results of the transfer of force from one set of atoms to another ; and the movements of these atoms affect the senses according to the velocity or intensity with which they move. Take, for an instance, the action that results when a fire is lighted under a steam boiler. An intense activity amongst the particles of fuel entering into new combinations is perceived by the eye in the flame and by the feeling in the sensation of heat. This motion is imparted to the air from the fuel and also to the iron of the boiler and through the boiler to the water, in which the force accumulates until it equals the cohesion and and pressure of the air ; but so soon as the accumulated power imparted from the moving atoms of fuel equals these resistances, the water moves. No matter how fast the power is transmitted from the fuel to the water, it cannot accumulate beyond these resistances, but at that intensity it gives a motion to atoms of water, and any increase of power only increases the velocity with which atoms of water move away from the mass. The steam thus set in motion imparts its force to the sides of the boiler or to a piston which also moves when the force equals the resistance of its load, and the steam after imparting a part of its force to the piston, sets the air in motion with the remainder, or if it is condensed, imparts the residue of its force to the water and iron of the condenser and falls inert by gravity. Through these successive transformations the sense of sight observes changes in form and color ; the sense of feeling observes changes in intensity of moving force ; apart from these there is no evidence of any action besides that due to the movement of atoms set in motion and transmitting the force mparted to them. Observe the changes termed electric in a cloud ; when the sun shines upon the surface of water the particles rise into the air floating as vesicles, and these magazines of power, being brought into contact by attraction or other causes, transmit their force to the air. The resistance of this medium is so light that the movement imparted to it is of infinite velocity and intensity, either as seen by the eye in light, or felt in warmth or judged of by its effect when imparted to any more solid object. But so soon as this amount of power is transferred to the earth it becomes less intense as it is diffused until it is imperceptible, or if it be imparted to the end of an iron rod, it is transferred amongst its atoms at so low an intensity as oftentimes to be imparted to the earth without being perceived at all. Here a ain the senses inform us of nothing beyond the transmission of force through matter offering varying resistances, and the same amount of force that will set atoms of air in movement, so that their activity is apparent to the eye as red light, may only affect the atoms of a rod of iron so gently that their movement is not perceived by any of the senses.

Consider next the action of a galvanic current in which, by the disturbance of atoms at one end of a series, feeble-force is communicated through a solution till the atoms at the further end of the series are impelled and form new compounds by mutual attraction ; or how the power that is intense if imparted from atom to atom of a fine wire becomes diffused if divided amongst the atoms of a larger wire which affords more objects on which the energy of the force is expended. Without attempting to enumerate the phenomena that may be explained by the action of force amongst the atoms of elastic bodies, or of those in which the atoms may be considered to rotate in contact with each other, as in magnetism, it is designed merely to suggest in this article whether all the changes that occur may not be viewed as the results of motion and of attraction, and whether the effects of changes in matter which appear different to the various senses should not be referred to the senses rather than to a set of imponderable agents all acting at the same time upon a body, the particles of which are in movement.

Three Good Whaling Voyages.—The ships *Hudson* and *Cornelius Howland*, from the Pacific, and the bark *Osceola 2d*, from the Indian Ocean, arrived at New Bedford on Thursday, bringing cargoes amounting to 8,670 barrels of sperm, and 250 barrels of whale oil. The value of the sperm is at least $183,500, and that of the whale nearly $8,000. These vessels have been absent between three and four years, and have made, at the above moderate figures for oil, very satisfactory voyages.

Thourette, formerly an unproductive commune in one of the departments of France, now appears like an immense orchard, as the parish priest, now nearly eighty years of age, has for thirty years insisted that the parents of every child he baptized should plant some kind of a fruit tree.

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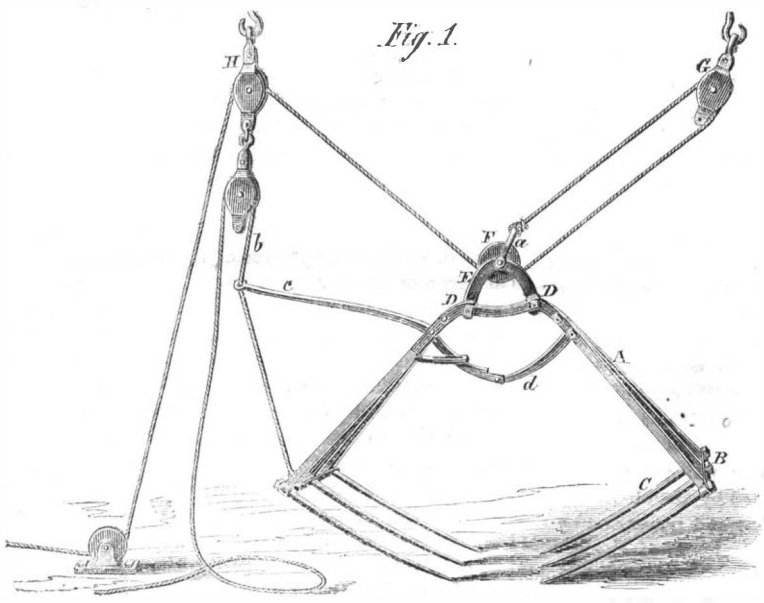
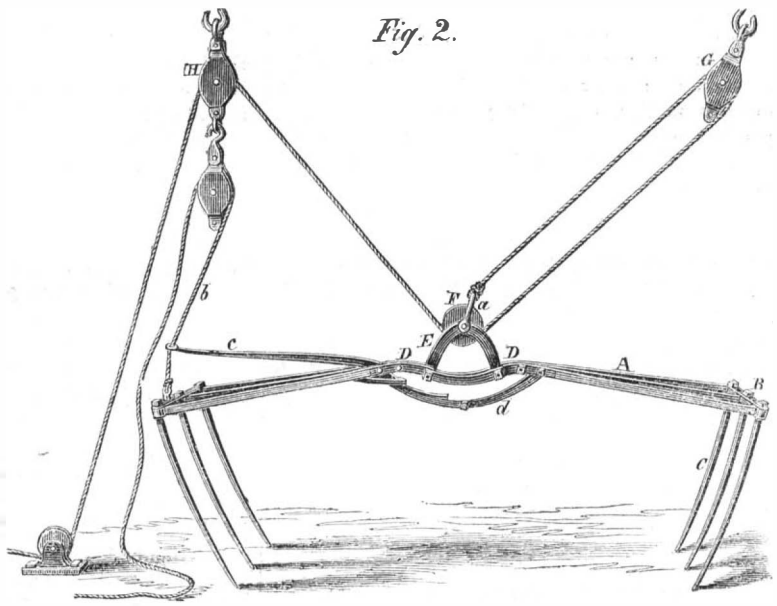
Improved Patent Hay Fork.

The apparatus herewith illustrated is a power hay fork for unloading carts or building up stacks more speedily than can be done by hand. By the employment of this apparatus large masses of hay can be removed from the field and deposited at any point desired—upon the wagon or, when in the barn, upon the mow itself. There is no more laborious work in the whole range of the farmer's duties than pitching hay up to the mow, and if this tax upon the strength of the agriculturist can be performed by machinery, it is evident that an important saving in human muscles will occur. This apparatus accomplishes the task thoroughly and should be found in every farmyard. The fork consists of the iron bars, A and B, firmly secured to each other, and the teeth, C. The frame or bars terminate in the shank, D, which is connected with the stirrup, E, by means of joints; in this stirrup the pulley, F, is fastened. There is also a small iron link, *a*, encircling the pulley to which one end of the hoisting rope is attached. This rope passes over the pulley, G, and from thence underthe pulley, F, to the block, H, on the other side of the building and over this last to the motive power—usually a horse. The pulley blocks are suspended from the roof of the barn or any other framing near at hand. The block, H, carries a smaller pulley at its lower end, over which the rope, *b*, is passed; this rope is secured to one side of the hay fork and is of sufficient length to be grasped by the farmer superintending the work.

Between the two sides of the fork, near the shanks, may be seen a lever, *c*, and an arm *d*. The lever has a series of projections on it, over which the link falls when the fork is detached from the load—were it not for this provision the fork would come back from the mow open. Fig. 2 shows the fork extended and the position of the several parts when in that condition. When the fork is about to be discharged of its load it is on a level with the pulley over which the disengaging cord passes; this explanation is made in order that the operation of the unlocking gear may be more fully understood, as it is impossible to so represent it in the engraving. The operation of this apparatus is very easily understood at a glance. When the fork is about to be loaded it is extended in the position shown at Fig. 2; the horse is then started, and as his power is exerted the arms close in and grasp the hay between them as shown in Fig. 1. The gravity of the mass causes the fork to hold its load without the attachment of any springs or other devices of that kind. When the fork is raised sufficiently high, the cord *b*, is pulled; the arms of the fork then separate and permit the hay to fall out. The arrangement of the parts is very simple and fully accomplishes the end in view, viz., to obtain an easy-working and reliable power fork.



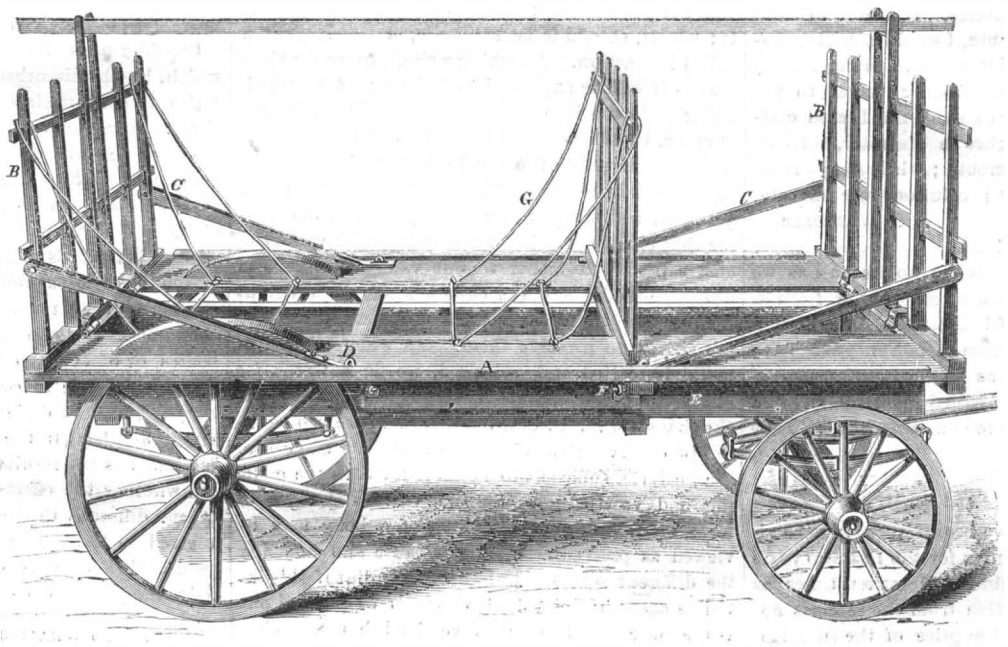


RAYMOND'S PATENT HAY FORK.

The patent for this invention was procured through the Scientific American Patent Agency, on Nov. 11, 1862, by Squire Raymond, of Genoa, N. Y., and further information can be obtained by addressing him at that place.

Improved Hay Rack.

Our idea of a good farmer is one who avails himself of the latest improvements in tools designed for his special use, and who keeps pace with the spirit of the age by employing them wherever possible. Certainly there can be but few places where the improved hay and grain rack, herewith illustrated, cannot be used to much greater advantage than the ricketty old things that are patched up for the occasion out of hoop poles, or some such material. This rack is a very neat one in its appearance, and has the advantage of being always ready for use. The engraving explains itself, but we shall dilate a little upon some of the main features, leaving the minor details to be comprehended as they will be readily, by the intelligent reader.



COBB'S PATENT HAY RACK.

The rack consists of the platform, A, and the upright frames, B. The two frames at either end have braces, C, jointed to each side of them; these braces have eyes at the platform end, which slip over staples in the same; a pin is then thrust through the staples retaining the whole structure firmly in place. There are also hinges at the bottom, so that by removing the bars from their staple, the upright frames can be folded down flat. The middle frame is permanently secured to the platform. This platform sets upon a wagon body or box, E, and is made fast to the same by iron links slipping over staples, F, four in number, on the body of the wagon. In the center of the end frames may be seen two vertical bars with pins near their upper ends. When the grain is loaded on the rack, a bar is laid across from these uprights, and the pin is thrust through the uprights over it, serving to bind the load firmly together. The ropes, G, are knotted together in a peculiar way, and have loops or bights which are slipped over the corner posts of the frames. These ropes being rigged in the manner shown by the engraving, the grain is placed thereon; the ends can then be grasped and connected with any horse-power and swung bodily off the rack, carrying the whole burthen with them. These are the principal features of this invention. The advantages it has over the primitive kinds have been fully set forth. We may add, however, that the box catches all the grain which may be prematurely thrashed out of the straw, and thus effects a great saving over others constructed without this attachment. This hay rack was patented through the Scientific American Patent Agency, by Russell Cobb, of Hadley, Mich., on Oct. 7, 1862; further information can be had by addressing him as above.

The "Blues."

Cheerfulness and occupation are closely allied. Idle men are very rarely happy. How should they be? The brain and muscles were made for action, and neither can be healthy without vigorous exercise. Into the lazy brain crawl spider-like fancies, filling it with cobwebs that shut out the light and make it a fit abode for "loathed melancholy." Invite the stout handmaiden, brisk and busy Thought, into the intellectual chambers, and she will soon brush away such unwholesome tenements. Blessed be work, whether it be of the head or the hand, or both! It demolishes Chimera as effectually as Bellerophon, backed by the goddess of Wisdom, disposed of the original monster of that name.

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NEW YORK, SATURDAY, APRIL 25, 1863.

OUR NATIONAL DEFENSES.

All the harbors of our large cities are skirted round by forts which, in the present improved state of ordnance and by the adoption of iron-clads, are rendered of very little use. This is saying a great deal, but the statement can be substantiated by facts. It is fresh in the minds of all persons that our iron-clads have repeatedly run the batteries at Vicksburgh, and that our fleet of wooden ships passed up to New Orleans in spite of Forts Philip and Jackson; disregarding the storm of iron that these works belched forth, they boldly and successfully dared the passage. They accomplished their purpose and obtained the surrender of the city by appearing before it with open ports and guns yawning from them. Such has been the experience at that point, and other cases, might be cited in proof of the assertion that ordinary forts are not only incapable of arresting the passage of an enemy's vessel or fleet, but that they themselves are very far from being any protection to the forces within. Fort Pulaski is an example in point; although this work was not by any means a modern fortress, one built of heavy granite; yet before the present war it was thought sufficient to defend the point on which it was erected.

With the rapid strides that our inventors have made, and are making, as well also those improvements which have been inaugurated in foreign countries, we may well question whether the forts now guarding the principal ports of the country are of any particular value. If at some future day an inimical armored ship-of-the-line should steam deliberately past our forts in the Narrows, or else maneuvering at a safe distance, riddle them with rifle shot and shell, we should mourn and deplore our folly and inefficiency when too late. What guarantee have we that such proceedings may not take place, or what assurances that the smooth and plausible proffers of friendship, amity, and neutrality are not so many schemes that our foreign foes employ to lull us into fancied security, until their preparations are completed? Already threatening murmurs arise in diplomatic circles; interests clash, and ministers with subtle phrases strive only to evade the truth. Dissatisfaction with England—at her course in fitting out privateers to prey upon our commerce—is rife among the influential classes; and who shall say that complications may not arise wherein the whole and sole dependence for liberty and property will fall upon our ability to maintain them at the mouth of the cannon? We have an iron-clad navy building which—sneer at it as they may—our enemies will find to their cost, should they inaugurate a war by interference, is amply able to defend us on the high seas; but can we rely upon those stationary structures, which, although efficient at one time, have been left stranded on the shore by the great wave of improvement now sweeping over the whole art of modern warfare?

The means to defend every port on the coast or inland seas are not wanting. Many schemes have been projected, none adopted; some of those plans were utterly useless; many more were in the highest degree practical and praiseworthy. Of the latter class is that system of national defense proposed by Timby, the inventor of revolving turrets. If ships can run by forts with impunity, the inference is that, if guns cannot prevent them from so doing, some other agent must; these means are found in obstructing the channels in such a manner that, though free ingress and egress can be had to peaceful ships, the entrance can be completely closed against those striving to enter unlawfully. These features are all provided for in the system mentioned, and the details of the plan are full of excellent features.

In addition to the plans just mentioned, there are others all practicable and eminently feasible. Mr. Reed of this city proposes a system of iron forts constructed of cast-iron blocks locked and jointed together by a peculiar arrangement of the component masses. Without criticizing his method of erecting such forts, it is apparent that a stubborn defense against siege or assault can be made by forts made impregnable by iron mail, when located so as to command the channel, as in Wiard's plans. When shall we assume the iniative, and lead off in improvement; instead of following timidly in the wake of other nations in experimenting on the best means of national defenses? Americans have a great reputation for individual enterprise and energetic adoption of any method or means that promises to pay for its introduction; yet, when it is left to the Government to decide what is best in certain circumstances, timidity, hesitation, and uncertainty characterises every movement. Other nations deemed it wise to provide an iron navy; but we, with that mysterious foresight which distinguishes the administration of our naval affairs, decided that they were of no use, until one fine day a rebel ram came down and sunk our prejudices and our wooden ships together! Fort McAllister resists bombardment from the heaviest shells and shot that were ever thrown, and we are told that the fort is iron-clad; this statement we do not believe, but it is a notorious fact that in all novel means of national defense, the despised rebels have been—solely through our own remissness—the first to introduce them and give them a practical trial. How long shall such a state of things as this continue? When shall we have a system of national defense commensurate with our standing as a people and our skill as inventors?

THE PROPOSITION TO INTRODUCE A STATE PATENT SYSTEM.

Several correspondents have written to us respecting the proposed State patent system which we briefly discussed on page 234, current volume of the SCIENTIFIC AMERICAN. Without going over the ground of this discusion again, we will present one or two points in the matter which seem to us not only pertinent but quite fatal to the proposed scheme.

The Constitution provides that Congress may enact laws for the protection of inventors and authors for a limited period. In pursuance of this provision a patent law has been enacted which limits the grant of Letters Patent to the *original* and *first inventor* of any new or useful improvement. This law is alike binding upon all the States; and on the trial of patent causes, the sole jurisdiction respecting their validity, &c., rests with the United States courts. It is proposed in the Massachusetts patent bill to grant Letters Patent to an *introducer* of another man's invention, or the introducer may also be the inventor of that for which he seeks a patent; for certainly it is not intended by this bill to withhold a patent simply because the applicant may happen to be the inventor. Now it is our opinion that this system will interfere in two ways with the Federal statutes. In the first place, if the proposed State patent law allows a patent to an *inventor* for a new and useful improvement, under any circumstances, it usurps the power delegated solely to Congress for that express purpose by the Constitution. In the next place, if the system allows a patent to the mere *introducer* of an invention made by another, it practically nullifies the Federal law, which expressly declares that no one, except the original and first inventor, shall be entitled to Letters Patent. We insist that no State has a right to enact laws which so directly fly in the face of the laws of Congress, and we say furthermore that a State patent granted to an introducer could not be maintained against an infringer on a question of law. The moment an appeal should be taken from the decision of the State courts to the Federal courts, that moment the illegality of the whole matter would be made clear to the most skeptical.

The patent laws of the United States are considered ample to protect the rights of all original inventors; and to introduce State action in this matter would open the door to expensive litigation and confusion. Besides we do not like that spirit which goes hunting through the Constitution for vague reservations in favor of States; and upon which attempts are made to build up systems of doubtful value and in seeming antagonism to the supreme law of the land. If the interests of Massachusetts are not sufficiently well protected by the existing patent law, we will cordially advocate all needed changes when pointed out to us; but this attempt to foist upon its people an independent system we consider very injudicious as well as illegal.

DEFECTIVE WROUGHT-IRON.

It has been noticed that most of the axles of the railway cars which have broken down while running have exhibited a crystalline fracture; parts of iron bridges which have suddenly snapped have also shown the same characteristics, and, from such evidence, it had been concluded that wrought-iron in car axles and bridges, when subjected to vibrations from continued use, changed its character and became as weak and unreliable as cast-iron for such purposes. No attempt had been made, so far as we know, to solve the problem how vibrations could produce such a change in the molecular arrangement of iron, but it was very generally believed that such a change did take place. This question deserves more general attention than it has received.

The fact is unquestioned that many broken wrought-iron axles, stay-rods of bridges, &c., have exhibited a crystalline fracture resembling that of cast-iron; but good evidence goes to prove that such defects in iron are due to imperfect treatment of the metal in its manufacture, not to vibrations in the structures to which it has been applied. This alters the case completely, because a remedy for this evil may be provided, whereas the belief in vibrations being the only cause of it, not only misdirected but perverted the public mind.

In a set of very carefully-conducted experiments to test the strength of bars of iron and steel, it was demonstrated that any bar of fibrous iron exhibited a crystalline or a fibrous fracture, according as it was broken suddenly or gradually by the strain to which it was subjected, thus affording evidence that vibrations had nothing to do with the result. One great cause of defective wrought-iron—that which exhibits a cast-iron fracture when broken—may be traced to imperfect modes of manufacture. Bar and plate iron are now made more rapidly than formerly. The metal, in a semi-fluid state, is passed from the puddling furnace through a succession of rollers without reheating or faggoting, and is at once reduced to the sizes of bars required. Very imperfect bars must occasionally be produced by this mode of operation, as parts of the metal are sometimes only partially converted into a malleable state. Many axles and rods made from iron bars thus manufactured must be defective and exhibit a fracture like that of cast-iron.

It is well known that the plates of exploded steam boilers have usually shown a crystalline fracture. The metal may have been defective from the very moment it came from the rolling mill. All iron and steel intended for axles of cars, bridges, boilers, ships or any structure upon which the safety of life and property are dependent in traveling by railroad, or otherwise, should be fully tested to ascertain its real nature, so that there should be no doubt about its safety before it is applied. We believe that there are thousands of tuns of bar and plate iron now applied to engineering structures which are unfit for such purposes.

THE PROPOSED CANAL ENLARGEMENTS.

It would appear from reliable data that the recent political manifestation in the Northwest had some other origin than the efforts of disaffected persons to create dissension between the citizens of that section and the manufacturing interests of the East. The difficulty seems to arise more particularly from the delay and expense which occur in getting the great grain crop of the West to market at remunerative prices to the producer. In 1838 the total quantity

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of breadstuffs exported from Chicago amounted to only 78 bushels; but in 1862, the total exports of these articles reached the sum of 55,720,160 bushels. This enormous increase has not been followed by a corresponding augmentation of facilities for transporting it, and the present railroads and canals, great arteries of trade and traffic though they be, are not sufficient, or at all events are but ill adapted to carry Western produce at such rates as will enable the farmers of that region to obtain a satisfactory return for their labor.

This matter has attracted the attention of those who see in the great West a boundless and almost illimitable tract wherein to cultivate food for the whole world, and they are desirous of relieving the trouble under which the Western farmers are laboring. Congress at its last session was petitioned to enlarge the canals. That body refused to take any action on the subject, and the project for the time being has failed. As the matter is thought too important in its bearings on commercial interests to be utterly lost sight of, a self-constituted committee have issued a call for a ship-canal convention to be held at Chicago, on the first Tuesday in June next, which will, no doubt, be largely attended.

To relieve the want in question, it is obvious it must, by the means proposed—a ship-canal from Chicago to the St. Lawrence—be a work of great labor and time; and it is difficult to see how any immediate relief could be gained in this way, We have no desire to throw any obstacles in the way of so grand a scheme as the one under consideration; but if the development of the great grain-growing resources of the West are to wait upon the completion of a ship-canal between the points in question, it would seem contradictory to the spirit, if not the letter, of the undertaking. That some feasible plan will be broached at the ensuing convention we have no doubt; and we sincerely hope that, if it conduces to the best interests of the country at large, it will be carried out. We reserve further discussion until the results of that meeting are made public.

PRACTICAL HINTS TO THE MACHINIST.

Since the days that witnessed the dismissal of the old-fashioned hand lathe from general use up to the present hour, a series of improvements have taken place which have rendered the turning lathe one of the most efficient tools in the machine-shop. Every mechanical operation should be considered, by the workman in charge of it, as an experiment by which he may acquire some positive information on subjects of interest to him and an important addition to the stock of professional knowledge. The laws which govern the motions of matter are positive and well-defined, but no fixed rule can be laid down for the speed of a shaft in the lathe. Statements have been made respecting the number of superficial feet which should pass by the tool in a given time, but as these assertions depend for correctness upon the tenacity of the iron, its nature, whether hard or soft and the lateral speed at which the tool moves, it is manifest that they cannot be generally applied. Such is also the case with the planing machine. Encyclopedias and pocket companions, with all due reference to their general utility, are not reliable in this respect, and statements only approximating to correctness can be obtained. If such is the fact, then, some will exclaim, what is the use of any treatise upon the subject? We reply that experience is in all cases more desirable than mere theories, and so far as the particular case cited extends, practical observation will supply the place of more pretentious systems. The workman will not drive his lathe as fast as some theorist says he should, for the reason that he *cannot* do so with economy; and it is just as unnecessary to make a positive assertion that a tool should move at a certain number of feet per minute, as it is to say that a tool will cut iron and brass with equal facility.

These are truisms the force of which every workman understands. We desire to impress upon the minds of our mechanics the need which exists that they should observe all peculiarities which arise in the working of metals on which they may be engaged—the form of tool which executes the work, the nature of the metal on which it operates, the speed, the feed and many other minor matters which will occur to every intelligent mechanic. Journals in general are silly things and diaries of daily life have cost the unlucky writers of them many a pang in after-life, as all their youthful follies came to light publicly, full-blown; but if a good turner would adopt the practice of recording in a little pocket-book the various matters relating to his special branch of the business, he would doubtless be much benefited.

Complicated work sometimes occurs in chucking an irregular form upon an ordinary lathe, and it saves time to know the changes of gears necessary to cut an irregular thread or rifle a gun; these and kindred subjects would be well elucidated and made plain to the eye at a glance by a single memorandum. The value of such a little book to the owner, if properly kept, would be very great, and it would be correspondingly useful to the trade if his experience could be made public.

THE ATTACK ON CHARLESTON.

The attack on Charleston, S. C., so long pending, was inaugurated on the morning of the 7th inst., by the iron-clad fleet under Admiral Dupont. After a spirited cannonade of thirty minutes, which was said to have been the most fearful on record, our fleet was obliged to withdraw in a damaged condition. The *Keokuk*, a small iron-clad vessel with 4½-inch side-armor, half iron and half wood, was sent to the bottom speedily. The *Passaic* was disabled by being struck at the base of the turret with a heavy shot, which so jammed the sheets as to prevent the tower from revolving. The same accident occurred, we are informed, to the original *Monitor*, in the attack on Fort Darling on the James River. Three others of the *Monitors* were struck and partially disabled. The *Ironsides* was struck some ninety times, but was not materially injured; she, however, refused to mind her helm, and was obliged to fall back out of range. In all about 150 rounds were fired at medium range, the obstructions with which the channel was filled preventing the *Monitors* from coming as closely to the rebel works as was desirable. The whole fleet finally retired, after the occurrences above related; and at the time we go to press the conflict had not been renewed. Several large holes were seen in the face of Fort Sumter. The expense of the shot and shell and the powder which propelled them, fired by the enemy on this occasion, must have been enormous and entailed a loss upon him which will be severely felt. Should our fleet succeed in retaining their present position, and not be compelled to relinguish it by storms or other unforeseen causes, they may yet give the enemy a dose of iron that he will not relish. In connection with this account of the attack on Charleston, we should like to ask the War Department what is the use in keeping thousands of soldiers in South Carolina? Up to this time the army there has been of no value whatever—so it seems to us.

THE IRON-CLAD STEAM-BATTERY "ROANOKE."

This splendid battery is now quite ready for active service, having been but little over a year in the hands of the Novelty Works, the firm who have put her in fighting trim. The *Roanoke* is said to be the only perfectly-plated wooden frigate in the world. The difficulties encountered in adapting tools to perform the work have been great, but they have been fully overcome by the resources of the establishment in question. The mechanical execution of the outside plating of the ship cannot be excelled; the curvature of the plates, to correspond with that of the hull, was accomplished very quickly by a powerful screw press invented by Mr. Edward Sauer, of the Novelty Works, and patented through the Scientific American Patent Agency; the connoisseur in such matters would be pleased to see the even and flush surfaces which the plates present to the eye. Where the edges meet there are no projections to offend the sight. The several forges in this city and in Massachusetts and Pennsylvania should also receive some portion of the credit for performing their part of the work so correctly. The weight of the armor on the sides, deck and turrets is immense, and we have obtained a few figures respecting it which will prove interesting to the curious in such matters:—The total calculated weight of the side armor is 650 tuns, without fastenings. The total calculated weight of the three turrets, with guns and all appurtenances except pilot houses, is 900 tuns. The total calculated weight of the two pilot-houses is 44 tuns. The total calculated weight of the deck plating is 42 tuns, amounting in the aggregate to 1,636 tuns dead weight of armor alone! These figures approach the real weights very nearly, but it is thought that they are under the actual amount rather than above it. The *Roanoke* was cut down from a frigate, and has had two decks removed, as also the bulwarks, two masts with rigging, and top hamper generally, and the old armament. When a wooden vessel, she drew (we are informed) between 24 feet and 26 feet of water; her draught at the present time is only 21 feet forward, and not greatly over that figure aft. When on an even keel we hazard the statement that she will touch 23 feet. Other particulars of the *Roanoke* have been so often published in the Scientific American that we forbear further recital of them, and await the time when she shall make the enemies of the republic tremble at her power.

IMPORTANT PATENT TRIAL---COTTON-CLEANING MACHINES.

We have recently received a printed pamphlet containing the charge of Hon. Judge Sprague, and the decision of the jury in the celebrated trial at Boston, during the last October term (1862), for the infringement of the patent of Isaac Hayden, of Lawrence (for an improvement in the long trunks of cotton machines), by the Suffolk Manufacturing Company, of Lowell. Distinguished counsel were employed by both parties:—For the plaintiff, William Whiting and Henry F. Durant; for the defendants, Caleb Cushing, George Ticknor Curtis and Causten Browne.

In preparing cotton for carding in factories, it is put through a picking or scutching machine, and driven by its blast through a long trunk with a slatted bottom, through which the dust and dirt fall. Cotton contains a considerable amount of dirt and sand, and the latter soon renders the cards dull if not removed. The invention consists of an improvement in such trunks for the more effectual cleaning of the cotton and the separation of the fibers. It embraces a long screen of finely-woven wire or twine dividing the trunk horizontally, with small cells underneath it, so closely set together as to prevent the blast underneath from carrying back the sand and dirt that had previously fallen into the cells. The screen is also coated with a varnish of shellac, or a suitable substitute, so applied as to fill the scores of the wires and thus prevent the fibers of cotton from adhering to them while passing through. The patent for the improvement was issued December 1, 1857, and the following is the inventor's claim:—"I claim covering the partitions of an elongated trunk or box, for cleaning cotton and other fibrous substances, with woven wire, having the scores formed by the weft crossing the warp of said wire screen filled with metal or cement, the whole combined in the manner and for the purposes set forth." The complaint of infringement was filed against the Suffolk Company in the Circuit Court of the United States, Boston, in April, 1861. In the October term of this court for that year, Mr. Hayden filed an additional declaration relating to the infringement, based on a patent granted on September 11, 1860, and which had been applied for as far back as December 11, 1854. The improvement was valued at $100,000, and the plaintiff alleged he had suffered actual damages to the amount of $20,000. The case came on for trial at common law in October, 1862, when the defendants presented certified copies of Letters Patent granted to Hayden on March 17, 1857, purporting to cover the same invention as the two succeeding patents, upon which the plaintiff had based his action. The examination and cross-examination of witnesses on both sides, and arguments of counsel, occupied the court from November 24 to December 18, 1862. Before the case went to the jury the plaintiff withdrew the patent granted in 1860, and the case was decided upon the patent of December 1, 1857. It was stated on the part of the plaintiff that trunks previously used for the same purpose varied from twenty to one hundred feet in length; that their grates were made of wooden slats with spaces of about one-fourth of an inch in width, and that the partitions under them were about four feet in width. These were alleged to be very defective in operation. Other gratings, formed

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of perforated sheet zinc, had been tried, which were found no better than the wooden slat grating. It was asserted that the improved wire-screen trunk separated long from short staple cotton, and also cleaned it so effectually from sand that cards run much longer before they are required to be sharpened.

The defendants endeavored to prove that Mr. Hayden was not the original inventor. This was a question of fact for the jury to decide according to the evidence presented. They also set up the defense that the patent of December 1, 1857, was inoperative and void, as the improvement was described, but not claimed, in Hayden's patent of March 17, 1857 (applied for on November 1, 1855), and was, therefore, public property. Judge Sprague was requested to rule accordingly, but refused. He was also requested by defendants to rule that the second patent of 1857 was inoperative and void, because the subsequent patent of 1860 embraced what was covered by the former patent; the judge also refused to rule upon this request; the judge also ruled out objections of the defendants' counsel to receiving the testimony of Henry R. Oliver (an experienced manufacturer) to the following question:—"State the practical benefits, if any, of using Hayden's improvements in cotton-cleaning, as described in his patents, over and above old machinery for cleaning cotton." This witness stated that plaintiff's improved trunk cleaned cotton more thoroughly, saving all the good fibers, doing less damage to the staple, and freeing the machinery from dust, dirt, &c. Yarns made from the cotton were less liable to breakage, the cloth produced was of an improved quality, and cotton costing 1½ cents less per pound could be cleaned to make goods equal in quality to those by the old machinery. Judge Sprague gave a most able charge to the jury, and a verdict was found for the plaintiff of $1,744 damages, which is equivalent to $150 per annum for the use of each machine.

The counsel for defendants have filed a bill of exceptions to the ruling of the judge in refusing to declare the patent of Hayden granted in 1857 void and inoperative, and for receiving testimony as to the value of the improvement, and for refusing to instruct the jury that Hayden had not an average price for licences at the time the writ was issued against defendants. Upon the bill of exceptions the case goes up to the United States Supreme Court at Washington. The evidence appeared to be in favor of Mr. Hayden being the original inventor; the exceptions are based upon side issues.

A notice, as follows, is printed at the end of the pamphlet:—"N. B. Any corporations or individuals who can furnish evidence to *rebut* Mr. Hayden's right to priority or originality of invention on either of the claims set forth by him in his three patents, are respectfully requested to address themselves to John Wright, agent of the Suffolk Manufacturing Company, Lowell, Mass., or to Henry V. Ward, treasurer, Boston."

We do not think the above notice confers any special credit upon its authors. It is a virtual acknowledgement of the originality of Hayden's invention, which the Suffolk Manufacturing Company is using to advantage, and still desire to use, if possible, without compensation to the inventor. We hope the company will at once acknowledge the claims of the inventor by a fair and honorable settlement.

To Manufacturers, Inventors, Agents, and others.

We are frequently very much puzzled to know what to do with models of machines that come to our office to be illustrated in the columns of the Scientific American. Some of these models are accompanied by letters stating that the artist is not to be guided by them in making his drawings, but must depict them entirely different as to details, disposition of the working parts, and the general arrangement of the whole apparatus. This strikes us as being slightly unreasonable and unbusinesslike. It takes a great deal of valuable time to study out the changes to be made, and then it occasionally happens that the inventor is not pleased with the alterations. All models sent to this office should be made in the manner that they are intended to work, and any changes that it is necessary to be made in them should take place before being forwarded; by so doing inventors and others will promote their own interest and save us a great deal of trouble.

PRESERVING BOTANICAL SPECIMENS.

A collection of dry plants is called an herborium. The plants are prepared for this purpose by placing them between folds of blotting paper inclosed within heavy sheets of pasteboard. The sheets of blotting paper must be changed as they become moist and fresh ones put in their place, the object of their use being to absorb the moisture of the plant. The proper season for gathering plants is when they are in flower. After they have become completely dry they are generally attached to white paper, but paper of different colors may be very properly used, because the various colors of the flowers can thus be more favorably contrasted. As dried plants are subject to the attacks of insects, they should also be moistened with a sponge containing a strong solution of corrosive sublimate mixed with alcohol, then dried before they are arranged in the herborium. The skeletonizing of leaves is an interesting art. A beautiful little treatise has lately been produced upon this subject, containing minute directions, by Edward Parrish, Member of the Academy of Natural Sciences, in Philadelphia, and published by J. B. Lippencott & Co. The author relates that he was attracted some years ago by a beautiful collection of prepared skeleton leaves and seed vessels that had been brought from Europe, and thus his mind was first directed to this subject.

The first account of preparing plant skeletons was published in 1723, by a Dutch naturalist named Frederick Ruysch. It stated that, through the putrefactive fermentation promoted by warmth and moisture, the pulpy matter of the leaf may be loosened so as to be removed from the fibrous skeleton, which may thus be preserved unimpaired. In order to prepare skeleton bouquets Mr. Parrish states that as soon as the summer foliage has fully expanded in luxurious variety, the collection of material may commence. But it is important that the amateur should make a proper choice of leaves. Every leaf for the purpose should be fully formed and have the firmness belonging to complete maturity, and be without blemish. It is stated that oak-tree leaves are unsuited for the purpose, also those of herbs which have short flabby leaves. The process of maceration and treating the leaves consists in placing them carefully in wood or earthenware vessels, pouring soft boiling water over them then keeping them down by placing pieces of glass upon them and setting them in a position exposed to the sun's rays during a portion of the day in summer or in any warm situation to induce fermentation. Fresh water must be supplied occasionally to take the place of that which evaporates. In about four or five weeks maceration, the leaves will have become sufficiently soft to be cleaned. This is accomplished by spreading the decayed leaf upon a plate of glass, and brushing it gently with a soft tooth or shaving brush. Leaves of a very delicate texture are cleaned by rubbing them gently between the thumb and the finger in water. The skin of the holly leaf is very difficult of removal. It usually requires from six to ten weeks maceration. It displays a double structure, as if two perfect leaves had been laid upon one another and had grown together at the edges.

The mode of bleaching those botanical skeletons is similar to that employed for bleaching cotton cloth. About a pound of the chloride of lime is stirred among two gallons of water, then allowed to settle, and the clear poured off into a stoneware vessel. The skeletons are laid in this carefully, and steeped until they become perfectly white. A solution of the chloride of soda is preferable, but it is more troublesome to prepare It is made by dissolving one pound of common carbonate of soda in one quart of water, stirring this among the solution of the chloride of lime, then allowing it to settle. The clear liquor thus obtained is the chloride of soda, the sediment is the carbonate of lime. When it is observed that the skeleton leaves have become perfectly white they should be removed from the chloride solution and washed in warm soft water. It is also an improvement to pass them through water slightly diluted with sulphuric acid, then wash them well afterwards. The leaves must be dried in the attitude they are designed to maintain and they may then be arranged in groups according to the fancy of those who prepare them. An endless variety of leaves thus skeletonized and bleached resemble fine lace work, and when made into "phantom bouquets" serve to adorn the homes of those who have a taste for collecting the beautiful and wonderful in nature.

CINCINNATI WATER WORKS---THE ENGINEER'S REPORT.

The Engineer of the Cincinnati Water Works, in his report to the Board of Trustees, makes the following observations in relation to certain improvements which have been introduced on the engines there employed:—

"Practice at these works has fully developed the folly of extra large steam passages, leading from the boilers to the steam cylinders of both the condensing and non-condensing engines, used in the pumping service.

"The copying of proportions as used in the marine service of the United States, where pistons are traversing from 350 to 450 feet and upwards, per minute, and applying the like proportions to machinery whose pistons' maximum speed is placed at 200 feet per minute, carries the evidence of folly on its face, the correction of which is well worthy the attention of engineers engaged in the construction or management of water works, operated by steam.

"A few practical hints may not be out of place, even here, while upon the subject.

"The non-condensing engines of the Cincinnati Water Works consist of two cylinders, each twenty-one inches bore and ten feet length of stroke, having induction valves of five and one-half inches diameter, with proportionate ports and steam pipes, of a similar diameter in the clear. Over two years have elapsed since the steam-passages, two in number, have been reduced from five and one-half to two and three-quarter inches diameter, reducing at the connection of steam pipe with the boilers to one-fourth its original capacity, and no other effect has been produced save and except the happy one of preventing the cylinders from being burdened with water of steam condensation. The maximum pressure upon these boilers being 95 pounds to the square inch, while the maximum pressure on steam cylinders is 60 pounds to the square inch, steam cut off at one-third the length of stroke, and worked expansively the remaining two-thirds.

"The non-condensing engines, two in number, have each a cylinder whose bore is 45 inches diameter and 8 feet length of stroke, having duplex or balance valves of 11½ and 10½ inches diameter, with corresponding valve chambers and piping of ample proportions, and fully adapted to a free and easy flowage of steam to the cylinders. The steam pipes have an internal diameter of 15½ inches.

"Both engines are worked from a single battery (?) of duplicates, at all times, by means of a cross-connecting steam pipe of 15½ inches internal diameter; and the valve on each battery was originally of the same dimensions; and before the cross steam pipe was instituted, each battery was fired for its accompanying cylinder.

"During the past year the boiler valves have been reduced from 15½ to 7¾ inches, say one-fourth of the area, for a single engine as originally used, but only one-eighth the area as at present used for both engines. It is worthy of remark that no change has been produced in the working of the engines.

"With the foregoing practical illustration, without the aid of science, it is no difficult matter to conjecture the heavy loss sustained by the works for unnecessary large radiating surfaces passing off large volumes of valuable caloric without producing any beneficial effect whatever. Where high velocity, or other great effect, must be produced regardless of cost of working, such proportions may be pardonable, but in machinery for supplying cities with their most essential element, and at the lowest possible rate, such construction should be at all times avoided, and all parts conducting the steam directly from the boilers to the steam cylinders should be proportioned to the natural requirements of the labor to be performed, and as much compacted as practicable, for good and effective working, as prudence and practice may dictate."

Methylated spirit is a compound of pure spirit of wine to which one-tenth of its volume of imperfectly purified wood-naphtha has been added.

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RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week. The claims may be found in the official list.

Automatic Rake and Binder for Harvesting Machines.—Among the numerous devices for removing the cut grain in compact gavels from the platform of harvesting machines, one of the most simple is a rake head attached at its respective ends to endless belts or chains, by which it is carried forward above the platform and back beneath the same. The present is an improved mode of mounting and operating a rake of the form named, by which it is rendered less subject to derangement and the vertical space required for its operation is reduced. The platform may be placed near the ground. The second and principal part of the invention is an apparatus adapted to completely bind a sheaf with its own or other straw. The band being laid in suitable position transversely beneath the grain, is seized at each end by pivoted arms of suitable construction, and by them is carried around the compressed gavel. While in this position each end of the band is griped by a pair of jaws, both of which pairs of jaws are mounted upon one hollow shaft and receive rotation therefrom, by which action the ends of the band are firmly twisted together. A rotary tucking hand is then advanced to tuck the twisted ends beneath the band, which is preserved from displacement by a suitable claw rotated simultaneously in the opposite direction. The completed sheaf is then released from the binding apparatus and cast into a receptacle in which they are collected and deposited upon the ground in heaps of a dozen or other desired number. This apparatus is entirely automatic in its action and has been proved effective by practical test. The above machines are the inventions of Robert D. Brown, of Covington, Ind.

Lamp Heater.—This invention consists in a lamp chimney with two or more openings in its bottom to fit to two or more burners in such a manner that one chimney can be used simultaneously for two or more flames; the invention consists also in the arrangement of two or more openings in the top of the bulb of a lamp chimney, in such a manner that one of said openings serves to carry off the products of combustion and the other opening or openings can be used similar to the holes in the top plate of a stove to receive vessels containing the articles to be heated and to expose the bottoms of said vessels to the direct action of the heat from the flames of the burners. W. T. Eddy, of West Hoboken, N. Y., is the inventor of this improvement.

Double Screws in Steamships.

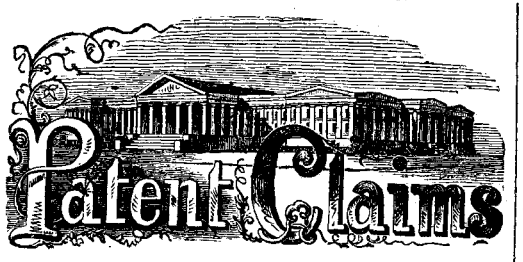
Considerable discussion has lately taken place in England respecting the origin of the application of two propeller-screws to steam vessels, and we have noticed that several ambitious engineers abroad lay claim to the honor of suggesting, if not applying, the powers in question to the propulsion of ships. The application of two propellers to enable vessels to turn easily or go ahead and back quickly, or steer a ship through narrow channels, are not of very recent invention in this country. They were applied twenty-two years ago and have been in use to a greater or less extent ever since.

To Nurses and Night-watchers.—We have had in use in our family, for some time past, the nursery or night lamp patented and manufactured by Messrs. W. L. Fish & Co., 539 Broadway, this city; it is a most convenient article—one which we could not easily dispense with.

A Michigan soldier, who was accused of stealing a rebel's goose, said that he found the bird hissing at the American flag, and arrested it for treason.

The Origin of Species—Causes of the Phenomena of Organic Nature. Published by D. Appleton & Co., New York.

This is a little volnme, and consists of a course of six lectures to working men, delivered by Thomas H. Huxley, Professor of Natural History in the Jermyn Street School of Mines, London, England. These lectures were suggested by the attacks that have been made on Mr. Darwin's famous work on the "Origin of Species;" and Professor Huxley may be considered as the interpreter of Mr. Darwin to general readers. He has the faculty of making scientific subjects clear to the popular mind; and these lectures form a short course of reading that is as instructive in its matter as it is pleasing in its style.



ISSUED FROM THE UNITED STATES PATENT OFFICE

FOR THE WEEK ENDING APRIL 7, 1863.

Reported Officially for the Scientific American.

*** Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the Scientific American, New York.

38,087.—Lamp.—James S. Atterbury and Thomas B. Atterbury, Pittsburgh, Pa.:

We claim, first, As a new article of manufacture, a glass lamp, or other article of like material, having a metallic hoop or collar, d, applied thereto, substantially in the manner and for the purpose set forth.

Second, We claim attaching a metal hoop to the collar of a lamp, while the lamp is in the act of being molded or "blown," the lamp, so formed, when withdrawn from the mold, being a complete merchantable commodity in a single piece, substantially as and for the purpose set forth.

Third, We claim making in one piece a glass lamp and collar, substantially as set forth.

38,088.—Shutter for the Port-holes of Iron-clad Vessels.—B. H. Bartol, Philadelphia, Pa.:

I claim the two shutters, E and E′, hung independently of each other, to the side of the vessel or battery, on shafts passing through the same, the said shutters being arranged in respect to each other and to the port substantially as and for the purpose herein set forth.

38,089.—Mounting Ordnance.—B. H. Bartol, Philadelphia, Pa.:

I claim mounting the carriage of the gun on a supplementary carriage, G, arranged to traverse segmental tracks on a turn-table, D, substantially as and for the purpose herein set forth.

38,090.—Drawing or Forging Metal Bars.—William Beach, Philadelphia, Pa.:

I claim the combination consisting of the balanced revolving hammer, A, and the adjustable anvil, B, the same being constructed, arranged and supported so as to operate together substantially in the manner described, for the purpose specified.

38,091.—Base for Artificial Teeth.—Julius A. Bidwell, Sturgis, Mich.:

I claim the employment, upon the bases of artificial teeth (being a part of the base itself) of a flexible air chamber or intervening medium, for the purposes and uses expressed, and in the manner substantially as set forth.

38,092.—Stump-pulling Machine.—A. E. Boynton, of Hartford, Wis., and G. R. Boynton, of Chicago, Ill.:

We claim, firstly, The fulcrum, g, or its equivalent, when used substantially as and for the purpose above described.

Secondly, We claim the mode of operating the lever, E, by means of the ropes, t and r, when used substantially as described.

Thirdly, The combination of the several parts when used as and for the purposes hereinbefore described.

Fourthly, We claim the manner of loading said machine for transportation, when done in the manner substantially as herein described.

38,093.—Automatic Grain-binder.—Robert D. Brown, Covington, Ind.:

I claim, first, In combination with a cradle, B, of any suitable construction, the arms, C C′, attached to shafts, c c, geared together by the wheels, c′, and rotated at proper intervals by a cogged segment, c5, to elevate the arms, C C′, and carry the band around the compressed gavel.

Second, The combination of the cam-wheel, c2, with the arms, C C′, for securing the band in the jaws, c4.

Third, In combination with the arms, C C′, constructed and operating substantially as herein described, I claim the employment or use of two pairs of griping or twisting jaws, D D, attached by separate pivots, d d, to a common journal, D′, and operating substantially as and for the purpose set forth.

Fourth, Driving the jaws, D, by the shaft, E, working within the hollow journal, D′, in the manner explained, to compress the said jaws with force corresponding with that required to rotate them.

Fifth, The combination of the spring stop, k2, cam, e2, and wheels, I and k, when the said parts are constructed, arranged and operate in the manner and for the purposes herein specified.

Sixth, The tucking hand, f, advanced and rotated simultaneonsly in any manner, substantially as described, for the purpose of tucking the twisted ends under the band.

Seventh, The claw, f′, employed to hold the band against the pressure of the tucker, f, as explained.

Eighth, The combination and arrangement of the shafts, F F′, yokes, f2, pinions, f3 f4, guides, H, and segment racks, h, to impart the required motion to the tucker, f, and claw, f′, substantially as set forth.

Ninth, The arm, G, provided with a cogged segment, g′, and employed to advance the shafts, F F′, intermiitently, in the manner and for the purposes explained.

Tenth, The segment cog-wheel, I i i′, constructed as described, in combination with the twisting jaws, D, and tucker, f, or their equivalents.

Eleventh, The arm, L, or its described equivalent, for casting the finished sheaf, substantially as explained, when used in the described combination with the pivoted table, N or N2, or other suitable receptacle for carrying the sheaves and depositing them in heaps.

Twelfth, The pivoted table, N or N2, fixed in slanting position and adapted to tilt automatically, in the manner described, for depositing the finished sheaves in heaps upon the ground.

Thirteenth, The curtain, P or P2, operated by the falling and rising of the table, N or N2, in manner substantially as and for the purposes set forth.

Fourteenth, The mode of combining the worm, s2, and slotted disk, O, or any substantially equivalent devices for counting the number of sheaves to be deposited in each heap, with an automatic binding machine, substantially as herein described.

38,094.—Self-raker for Harvesters.—Robert D. Brown, Covington, Ind.:

I claim, first, The continuously revolving rake, B, carried forward over the platform and back beneath the same by means of driving chains, belts, or their equivalent, and elevated to its working position during its forward motion and retracted in passing beneath the platform by means of the crank arm, D, working in the eccentric or irregular slot, d, as herein described and for the purposes specified.

Second, The intermittent cradle, F f, operated as described, in combination with the continuously revolving rake, B, for the purposes set forth.

38,095.—Manufacture of Chewing Tobacco.—Hugh M. Cochran, McConnellsville, Ohio:

I claim, first, Curing or sweating tobacco previous to its being put "in case," by exposing the same to a free circulation of heated air, substantially as set forth.

Second, Combining with the curing of tobacco, previous to being put "in case," the preparing of the molds with a flavoring liquid, whereby the appearance and taste of the product is greatly improved, while its easy delivery from the mold is thereby secured, substantially as set forth.

Third, Combining with the curing and sweating of tobacco, previous to being put "in case," and the pressing the same into molds coated with a flavoring liquid; the submitting of the tobacco to a second press previous to its being packed ready for market, substantially as set forth.

38,096.—Friction Match.—James R. Day, Hudson City, N. J.:

I claim the pointed friction match, substantially as described, the point being of a conical, pyramidical, three-sided, or bayonet form, or other analogous form, as set forth.

Also, I claim burning the point of the pointed match splint, substantially as and for the purposes described.

38,097.—Ruffle.—Samuel F. Dickinson, New York City:

I claim, as a new and useful article of manufacture, a machine-made ruffle in which a strip of cloth is first ruffled and the gathers or plaits secured by stitching, and the ruffled piece then fastened to a band by one or more additional independent series of stitches.

38,098.—Railroad Frog.—George W. Douglass, Scranton, Pa.:

I claim, first, Combining the movable side rails of a railroad frog with each other (independently of its point) by means of a connecting bolt, H, and intermediate stay or collar, G, substantially in the manner and for the purpose herein set forth.

Second, The combination and arrangement of the lateral springs, O O, or their equivalents, with the side rails, R R′, of a railroad frog, substantially in the manner and for the purpose herein set forth.

Third, Fastening and securing in its proper position the tapering end of the point, K, of a railroad frog, by means of an under-hanging lipped projection, t, and receiving chair, M, substantially as set forth.

Fourth, Combining the vibrating rails, R and R′, with the point, K, of my improved railroad frog, substantially in the manner and for the purpose herein set forth.

38,099.—Method of actuating the Feeding Apparatus of Seed Planters.—James K. Dugdale, Richmond, Ind.:

I claim the sliding device, D, in combination with the frame, C, and wheel, B, when used in connection with the feeding mechanism of a seed planter, as and for the purpose set forth.

38,100.—Hopple for Horses and other Animals.—Captain R. N. Eagle, Washington, D. C.:

I claim constructing hopples for fettering animals with bars, B B, adapted to permit a limited motion of the attached ends of the strap or cord, D, independently of the leg band, and without turning or slipping the latter.

38,101.—Magnetic Razor-strap.—D. Earle, Palmyra, Ohio:

I claim the herein-described permanently magnetic hone, when the same is constructed substantially in the manner and for the purpose herein specified.

38,102.—Lamp-heater.—Willard T. Eddy, West Hoboken N. J.:

I claim, first, A lamp chimney having two or more openings in its bottom to fit simultaneously to two or more burners, substantially as and for the purpose herein specified.

Second, The arrangement of two or more holes, e e′, in the top of the bulb, E, of a lamp chimney, substantially as and for the purpose described.

38,103.—Slate Roofing.—Edward P. Farnum, Ijamsville, Md.:

I claim, first, The combination of the rafters, A, bearings, D, and slates, E; all arranged in the manner substantially as and for the purposes herein specified.

Second, The described combination of the longitudinally-grooved bearings, D d d, with slates laid and arranged as above set forth.

Third, The staple, H, and key, I, applied in the manner explained, in combination with slates, E, and bearings, D d d.

Fourth, The transverse bars, J, and wedges, K, employed in combination with the slates, E, and staples, A, in the manner and for the purposes explained.

[By this invention the weight of a slate roof is reduced one-half, and a roof of greatly increased efficiency produced at a less cost.]

38,104.—Harness Saddle-tree.—John Fonda, Albany, N. Y.:

I claim forming an elevated recess, a, above the arch of the front bow, and attaching the cantle piece in a socket or cavity behind the bolt hole of the front bow above said elevated recess, substantially as and for the purpose herein specified.

38,105.—Railroad Car Spring.—Herman Gardiner, New York City:

I claim, first, The use of the semi-elliptic spring supported on a bed-plate between the flanges, B, in combination with the box, D, arranged and operating substantially as hereinbefore set forth.

Second, I also claim the use of the plates, E, and H, having short studs or pins, F I, in their opposing faces, as hereinbefore set forth, in combination with the spiral springs, G, and box, D, arranged and operating in combination with the semi-elliptic spring, substantially as hereinbefore set forth.

Third, I also claim the use of wool, or other fibrous material of a similar nature, packed in a cylinder or box, in combination with the spiral steel springs, for the purposes hereinbefore set forth.

Fourth, I claim the use of the semi-cylindrical bearings, K, on the truck plate, in combination with the cap plate, E, working in the cylindrical box, D, and resting upon the spiral springs, for the purposes hereinbefore set forth.

38,106.—Submarine Harbor Defense.—John S. Gilbert, New York City:

I claim the construction of two or more sections, in the manner herein described, in combination with tanks, for the purposes of either imparting buoyancy or ballasting the same, while being raised or sunken; and also connecting the said sections together with a series of chains, as and for the purpose herein set forth.

38,107.—Treadle Motion.—A. W. Harris, Providence, R. I.:

I claim a pawl or pawls acting by means of an independent treadle, in combination with the crank and crank treadle of sewing-machine tables, as herein set forth.

38,108.—Portable Fence.—R. Haynes, Oberlin, Ohio:

I claim the herein-described construction of the panels of a portable fence, in combination with the uniting the same by means of the pins, H H′, passing through holes in the rails, B B′, substantially as herein set forth.

38,109.—Clod-crusher.—Silas Hewit, Seneca Falls, N. Y.:

I claim the adjustable clearers, E, arranged as shown, in combination with the toothed cylinder, D, for the purpose specified.

[This invention consists in the employment or use of a toothed cylinder formed of two or more sections placed on one and the same shaft, which is fitted in a rectangular frame provided with clearers and also with adjustable wheels and a cap, all arranged in such a manner that the implement may, by a very simple manipulation, be so adjusted that the toothed cylinder will rest upon the earth and, as the implement is drawn along, crush the clods and pulverize the soil and also be capable of being so adjusted that the toothed cylinder may be elevated above the surface of the earth and be supported by wheels so that it may be drawn from place to place with the greatest facility.]

38,110.—Ordnance.—Jas. C. C. Holenshade, Cincinnati, Ohio:

I claim the two plates, one on each side of the breech cylinder which surrounds the faucet breech containing the charge, provided with oblique faces or sections of metal in one or more pieces around the breech, and securely connected to it, and working against counter plates in the sides of the breech cylinder, so as to release and tighten up the faucet breech and bring the chamber containing the charge opposite the bore of the gun in firing, as described.

38,111.—Spark-arrester.—Jacob Hovey, Cleveland, Ohio:

I claim, first, The screen or diaphragm, H, in the smoke-box, A, arranged as and for the purpose specified.

Second, I claim the deflector, H′, when arranged as and for the purpose set forth.

38,112.—Combination Cement and Metallic Pipes.—Henry Knight, Brooklyn, N. Y.:

I claim the application and use of wrought-iron frames or tubes of the form of a truncated cone at one end or along their whole length, to pipes lined or coated with hydraulic-cement mortar, or both lined and coated, for the convenient jointing of the same in their

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several lengths, and at the same time retaining the cylindrical form and finish.

I also claim the application and use of metallic tapping rings, bosses or thimbles, to pipes of wrought iron, lined or coated with cement mortar, or both lined and coated, substantially in the manner and for the purpose described.

38,113.—Printers' Ink Roller.—George Littleton, Cleveland, Ohio:

I claim the construction and arrangement of the roller, A, and collar, C, with the flanges, B and D, the screw and nut, E, pin, f, counterbalance, g, bearers, H H H H, wires, I I, cushions, K, and the prepared rubber surface, L, in the manner herein described and for the purpose s et forth.

38,114.—Crushing and stripping Sugar Cane.—L. Mancy and C. Branger, St. Morgan, Ill.:

We claim, first, The pressure rollers, C D D′, two or more, in combination with the endless inclined discharging apron, I, rotary knives, j, guide bars, G H, and inclined table, E, all arranged for joint operation, as and for the purpose herein set forth.

Second, The manner of holding or sustaining the table, E, and inclined endless apron, I, in inclined positions, to wit, by means of the arms, h h t t, connected to the uprights, B B, as set forth, in combination with the guide bars, G H, notched as shown, rotary knives, j, table, E, and pressure rollers, C D D′, all arranged for joint operation, substantially as and for the purpose herein set forth.

[This invention consists in the employment of pressure rollers combined and arranged with rotary knives and guides and an endless discharging apron in such a manner that the leaves will be cut from the cane as the latter is fed to and between the pressure rollers, and the crushed cane discharged from the machine directly into a cart or wagon.]

38,115.—Turning Edges of Plates or Metal Sheets.—J. F. Morgan, Boston, Mass.:

I claim the combination of the movable folder, B, and the platform, C, with the gears, D D, and racks, E E, or equivalent machinery for moving the said platform, in manner and by movement of the folder, substantially as specified.

I also claim the application of the folder to the platform-moving mechanism by means which will admit of the folder being moved or turned without creating, in the meantime, any movement of the platform.

38,116.—Manufacturing Nuts, Bolts, &c.—John Marsden, Orrell, England:

I claim, first, The making, forging and punching nuts and washers, without waste of metal, from round rod or bar iron, or other metal, by the combination of mechanical parts put together and working essentially as hereinbefore described and shown.

Second, I claim the making of bolts or spikes by and with the combination of mechanical parts, the modification herein directed being previously made, put together and working essentially as hereinbefore described.

38,117.—Pump.—J. M. H. P. Metivier, Paris, France:

I claim the employment in pumps of two shafts jointed together, and of inclined pump barrels and pistons, all being fitted and caused to act, substantially as hereinbefore described and illustrated in the accompanying drawings.

38,118.—Operating Ordnance on War Vessels.—W. P. Miller, Marysville, Cal.:

I claim, first, The combination of the movable hatches, r r, and boxes, s s, with the screws, i i, gearing, j k l, and nuts, t t, the whole being constructed, arranged and employed in the manner herein set forth, to raise the gun above the upper deck for firing, lower it to the intermediate deck for loading, and when not in use, deposit it in the lower part of the hold as ballast, the hatches, when in position, serving also to preserve the screws from deflection, as explained.

Second, The sliding hatches or gates, P′ P″, formed respectively with a concavity, 1, and a projection, 2, in the described combination with the curb, d, of the turn-table, for the purposes specified.

Third, The combination with the turn-table, c, of the removable shaft, g, and sliding capstan, h, as herein shown and described, for the purpose of training the gun when elevated and permitting its descent either on to or below the intermediate deck, as described.

38,119.—Drill Bit.—S. A. Morse, East Bridgewater, Mass.:

I claim a twist drill in which the spiral grooves are so cut or formed that the curvature of that side of the groove, which makes the cutting edge, is very nearly in the direction of the radius, and when the drill is ground at the ordinary angle, presents a straight and acute-angled edge or lip to the metal or other substance that is to be drilled.

In combination with the form of the drill, as above set forth, I claim the increasing twist to facilitate the discharge of the borings or chips.

38,120.—Straw-cutter.—Eli Odell, Winterset, Iowa:

I claim the arrangement of a series of knives in a spiral form, mounted on a cylinder in a horizontal position, and said knives so reversed as to work in combination and match with the stationary cutters, V, on the bottom of the hopper, for the purpose herein set forth and described.

38,121.—Propeller Blade.—W. G. Oliver, Buffalo, N. Y.:

I claim making a raised screw curve or projection upon the face of the blade, and extending on to and crossing the shank and terminating outwardly and upwardly in an angle as represented in the drawings at A2, for the purposes set forth.

38,122.—Caoutchouc Shirt Collar.—J. A. Pease, New York City:

I claim a shirt collar made of rubber and that will resume its position when bent or forced out of place, substantially as before and for the purpose described.

38,123.—Harvester.—J. J. Piggot, Belleville, Ill., and C. L. Crowell, Peoria, Ill.:

We claim, first, A shaft, I, adapted to the location shown and provided with converse-acting cams, T U, in combination with converse-acting cutters, in the manner and for the purpose described.

Second, The combination of the revolving cam shaft, I T U, radial arms, K, and gearing of the draft frame, with the upper and under cutters, all constructed, arranged and operating substantially in the manner and for the purpose described.

Third, So fitting the reel supports to guides, f f, in the draft frame that they are both guided and stayed above the points where they are fastened in the finger beam, substantially as described.

Fourth, The draft frame, constructed substantially as described, so that it may be increased or decreased in width, for the purpose set forth.

Fifth, The swinging radial arms, M, on the hind axle, substantially as and for the purposes set forth.

Sixth, The back beam, L, in connection with the swinging radial arms, M, suspending and adjusting lever, P′, and grain end of the finger beam, substantially as and for the purposes set forth.

Seventh, The arrangement of the back beam, L, and the finger beam, H, on the side draft frame, so that they may be adjusted from the one driver's seat, either separately or together, substantially as and for the purposes set forth.

38,124.—Cultivating Machine.—W. F. Quimby, Stanton, Del., and G. G. Lobdell, Wilmington, Del.:

We claim, the arrangement and combination of the windlass, l, levers, G, digging cylinders, D, with teeth, h, attached to fixed or oscillating bars, pendent arms, k, pulverizing cylinder, J, and windlass, p, all constructed and operating in the manner and for the purpose set forth.

[The object of this invention is to construct a rotary digging machine which can be drawn along by horses or other draft animals, or which may be propelled by a steam engine placed on its frame, the digging teeth being so arranged that they can also act as propelling teeth whenever it is desired.]

38,125.—Mariner's Compass.—E. S. Ritchie, Brookline, Mass.:

I claim the combination of the auxiliary air vessel or indicator, E, and the connecting rod, B, or mechanical equivalents therefor, with the magnet or magnets, g, or the same and its or their air-tight or buoyant case, D, the whole being arranged within the vessel or case, A, to contain water or other proper fluid, and so as to operate together substantially as above specified.

I also claim the combination of either or both the buoyant air vessels, D E, with their shaft or rod, B, by means of gimbals, h, or their mechanical equivalents, the shaft or rod, B, being arranged and supported within a case, A, substantially in manner and so as to operate as described.

I also claim the combination of an auxiliary buoyant vessel, e, or its equivalent, with the rod or connector, B, the magnet or the same and its buoyant case, D, and the auxiliary case or indicator, E, as arranged within a case or vessel, A, containing water or other suitable fluid, and so as to operate therein substantially as hereinbefore specified.

I also claim the improvement of arranging the cardinal divisions on the external periphery of the circular indicator, E, substantially as specified.

I also claim the combination and arrangement of a hollow globe, b2, open at top and bottom, and its supporting gimbals, with the water case or vessel, a, and the magnet buoyant vessel therein.

I also claim the magnet air [vessel, as made of an elongated form, and as having its magnet or magnets arranged lengthwise within it, substantially as represented in Figs. 6, 7 and 8, of sheet 1, and as hereinbefore specified.

I also claim the combination of two or more buoyant radial floats or arms, a2 a2, with the elongated magnet vessel, the said arms being for the purpose hereinbefore stated.

I also claim the combination of a graduation ring, f, with the radially-armed float, E, its connecting rod, B, and the magnet float, D, when arranged and combined within a water vessel, A, in manner and so as to operate substantially as described.

38,126.—Mariner's Compass.—E. S. Ritchie, Brookline, Mass.:

I claim the combination and arrangement of a series of divisional plates, E E, or their mechanical equivalent or equivalents, with the bowl or liquid case, A, and the magnet, or with it and its supporting card or float, B, the purpose of the said plates being as described.

I also claim the combination of one or more either flexible or elastic-expansion chambers or vessels, C, with the bowl or water case, A, containing a magnet and float or card, as specified.

I also claim the combination and arrangement of an open divisioual ring, c, with the magnet, M, its flat, B, or with the same and the radial arms, b b, the whole being substantially as specified.

I also claim the arrangement of the cardinal divisions, viz., on the inner face of the divisional ring, c, or on the same, and the magnet case, B, or the latter and the radial arms, b b, as specified.

38,127.—Fortification.—Almon Roff, Bridgeport, Conn.:

I claim the arrangement of the cast-iron grooved and tongued blocks to be used in the construction of fortifications in the manner substantially as herein set forth and described.

38,128.—Combined Smut Machine and Separator.—Jeremiah Routh, Grayville, Ill.:

I claim the shoe, J, provided with screws, K L, which divide it into compartments, M N O, terminating at their lower end into discharge spouts, g h i, respectively, and vibrating on hinge, R, in combination with the case, A, scouring cylinder, E, shaft, G, and crank wheel, I; when the whole are arranged in the manner and for the purpose specified.

[This invention consists in the arrangement of a shaking shoe which is provided with a number of screens of different degrees of fineness, for separating weeds, cheat, cockle, and other extraneous matter from wheat, in combination with a scouring device of peculiar construction, whereby the wheat in once passing through the machine is cleaned in the most thorough manner.]

38,129.—Hay-elevating Fork.—L. Rundell, Coxsackie, N. Y.:

I claim the combination of the bail, E, arm, F, or its equivalent, and the catch, I, when arranged relatively with each other and the fork, or the head, A, thereof to operate as and for the purpose herein set forth.

[This invention consists in the combination of a bail and catch, arranged in such a manner and in such relation with the fork, that the latter will be retained in a proper position while being hoisted and the load securely held by the fork, while the latter may at the proper time, or at the will of the operator, be tilted or freed from the bail so as to admit of the easy discharge of the load from the fork. The several parts also, by their arrangement, form a very compact device, and one not liable, in being hoisted, to be brought in contact with the beams or internal fixtures of a barn and the parts liable to get out of repair or become deranged by use.]

38,130.—Portable Dressing Case.—John Russell, Boston, Mass.:

I claim the socketed spring jacket, D, and the vessel, cup or case, A, constructed in manner and so as to contain or have combined with it, articles substantially as specified.

38,131.—Portable Fence.—Joseph B. Tillinghast, Racine, Ohio:

I claim the panels having the posts all one side provided with the extension rails, L, fitting into the spaces, K, with the post, E, interlocking with the post, H, all constructed in the manner and for the purpose set forth.

38,132.—Folding Chair.—E. W. Vaill, Worcester, Mass.:

I claim, first, The application of the folding back, D′ H, to a camp stool or chair such as described in Letters Patent granted to me on the sixth day of January, 1863.

Second, In combination with a camp stool or chair substantially as herein described, I claim the hinges, J J, applied to the front edges of the back pieces, D′, and legs, D, and secured by flanges or plates, j j, let into the wood and bolts, pins, or screws passing transversely through the same as specified.

38,133.—Skate Fastening.—George Weber, Newark, N. J.:

I claim the cramps and catches constructed and arranged in the manner and for the purpose specified when the same are used in combination with the lever, c.

38,134.—Stocking-heel Protector.—J. N. C. Savels, Stoughton, Mass., assignor to Benjamin D. Godfrey, Milford, Mass.:

I claim as a new article of manufacture, a heel protector made to fit upon and be worn over the heel of a stocking as above described.

38,135.—Machine for cutting Rasps.—David Shattuck, Cambridge, Mass., and John S. Shattuck, Walden, Mass., assignors to the Whipple File Manufacturing Company:

We claim arranging the cutter upon a traversing carriage and moving the same across the face of the rasp with a changing motion for the purpose of placing the teeth in rows as set forth.

We also claim in combination with the above the cams, H4, operating as set forth for the purpose described.

38,136.—Burglar Alarm.—Chas. H. Stone & Chas. W. Livingston, South Groton, Mass.:

We claim the combination of the spring, a, and wheel, c, the pawl, k, the wheel, d, and the double pawl, e, with the hammer, f, also the combination of the lever, i, with the stop, h, and crank, g, with the start, f, constructed and operating substantially as described and for the purposes set forth.

38,137.—Producing Light and Heat and applying the same.—Levi L. Hill (assignor to Wyman R. Barrett), New York City:

I claim, first, The combination of the vapors of a hydro-carbon, atmospheric air and steam or the vapor of water, under pressure substantially as described, for producing by ignition an intensely heated jet of flame for generating steam, and for metallurgic and other similar purposes.

Second, The use of a platinum cap or chimney constructed and operating as described in combination with a jet of the mixed vapors of a hydro-carbon and air, with or without steam or the vapor of water, for the production of light.

38,138.—Apparatus for preventing Obstructions in Water Pipes.—Thomas D. Bond, Howard county, Md.:

I claim the combination with a water pipe of the trap, E, the strainer, B, the port, A, and the adjustable valves, F and G, or the equivalents thereof substantially as described.

RE-ISSUES.

1,446.—Machine for forming Button-backs and connecting the Eyes thereto.—The City Manufacturing Company (assignees by mesne assignments of James C. Cooke), Waterbury, Conn. Patented July 27, 1852:

I claim, first, The jointed clamps, i i (Fig. 2), and the tongue, n, (Figs. 1. 3), to form the eye, when combined with the slide, L, with its stationary and movable jaw, a b, the movable jaw and slide being worked by a jointed lever, c c′, to feed the wire, the whole constructed and operated substantially as described.

Second, The die for punching and forming the button-back, composed of the punch, S, and bed, Q, when combined with the slide, p p, and feeding cylinder, P, when constructed and operating substantially as described.

Third, The jointed fingers, u u, for receiving the button-back, when formed and punched, and conveying it to and placing it on the eye, when combined with the setting and riveting punch, U, when constructed, arranged, combined and operated substantially as described.

Fourth, Holding the eye of the button, in the mechanism that forms the eye until and while the back is placed upon and fastened to it.

1,447.—Furnace of Steam Boilers.—Joseph P. Evans, Hazleton, Pa. Patented April 1, 1862:

I claim, first, The employment or use of a series of elliptical tubes, B, fitted in the fire-box, A, when said tubes are made to communicate with the water space at the ends of the fire-box, substantially as herein set forth.

Second, Having the fire grate made with an alternate arrangement of large elliptical tubes and small cylindrical tubes or bars in the manner and for the purpose herein shown and described.

Third, The arrangement of the elliptical pipes, D, and connecting pipes, E, with each other and with the water space, as herein shown and described.

[This invention consists in the employment or use, for the grate of a boiler furnace, of a series of tubular bars of elliptical or substantially similar form in their transverse section, and using in combination with said bars a series of alternately-interposed tubular or solid bars of round form, the elliptical bars being so much deeper than the round ones, as to expose a great portion of their surface to lateral contact with the incandescent fuel upon the grate, and cause the rapid generation of steam from the water which circulates through them between the water spaces at opposite ends of the fire-box. The invention also consists in the arrangement within, and at the sides and ends of the fire-box, of bent pipes having an elliptical or flattened transverse section, connected each at one end with the upper part of the water space surrounding the fire-box, and at the other end with a lower portion of said water space, such pipes being exposed to the intense radiant heat of the fire, and to the contact of the heated and inflamed gases of combustion, and having induced through them a natural circulation of water, which is rapidly converted into steam.]

1,448.—Pulp from Wood, &c., for the Manufacture of Paper.—William F. Ladd, New York City, and Morris L. Keen, Philadelphia, Pa., assignees of Chas. Watt & Hugh Burgess, London, England. Patented July 18, 1854. Antedated Aug. 19, 1853. Re-issued Oct. 5, 1858:

We claim a pulp suitable for the manufacture of paper, made from wood or other vegetable substances, by boiling the wood or other vegetable substance in an alkali under pressure, substantially as described.

1,449.—Process of treating Wood or other Vegetable Substances in the Manufacture of Paper Pulp.—Wm. F. Ladd, New York City, and Morris L. Keen, Philadelphia, Pa., assignees of Chas. Watt & Hugh Burgess, London, England. Patented July 18, 1854. Antedated Aug. 19, 1853. Re-issued Oct. 5, 1858:

We claim, first, The process of treating wood or other vegetable substance by boiling in an alkali under pressure, as a process or preparatory process for making pulp for the manufacture of paper from such woods or other vegetable substances, substantially as described.

Second, We also claim the process of treating resinous woods by boiling in an alkali under pressure, and treating the product with chlorine and its compounds with oxygen for making white pulp, for the manufacture of paper from such woods, substantially as described.

1,450.—Preparing Hides for Tanning.—Amos D. Lufkin, Cleveland, Ohio. Patented July 31, 1860:

I claim the process of treating hides by the use of sulphur for the purpose of removing the hair and preparing them to be tanned substantially as herein described.

EXTENSION.

Method of ensuring the action of the Valves in Direct-action Pumping Engines.—H. R. Worthington & Wm. H. Baker (Adelia C. Miller, executress), New York City. Patented April 3, 1849:

We claim, first, The removing or reducing the resistance against the pump piston in direct-action steam pumps at the proper time in the stroke by effecting a connection between the water on both sides of the piston in order to allow either the momentum of the moving parts, on the expansion of the steam already within the cylinder, or both conjoined, to act as explained, to throw the steam valve across the ports with certainty, whether at high or low speeds.

Second, We claim the method herein described of effecting the before-mentioned and claimed object, namely, by making two passages into each end of the cylinder, across one of which the piston is forced, opening by this means free communication between the two ends of the cylinder.

IMPORTANT TO INVENTORS.

PATENTS FOR SEVENTEEN YEARS.

MESSRS. MUNN & CO., PROPRIETORS OF THE SCIENTIFIC AMERICAN, continue to solicit patents in the United States and all foreign countries, on the most reasonable terms. They also attend to various other departments of business pertaining to patents, such as Extensions, Appeals before the United States Court. Interferences, Opinions relative to Infringements, &c. The long experience Messrs. MUNN & Co. have had in preparing Specifications and Drawings, has rendered them perfectly conversant with the mode of doing business at the United States Patent Office, and with the greater part of the inventions which have been patented. Information concerning the patentability of inventions is freely given, without charge, on sending a model or drawing and description to this office.

THE EXAMINATION OF INVENTIONS.

Persons having conceived an idea which they think may be patentable, are advised to make a sketch or model of their invention, and submit it to us, with a full description, for advice. The points of novelty are carefully examined, and a written reply, corresponding with the facts, is promptly sent free of charge. Address MUNN & CO. No. 37 Park Row, New York.

PRELIMINARY EXAMINATIONS AT THE PATENT OFFICE.

The service we render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there, but is an opinion based upon what knowledge we may acquire of a similar invention from the records in

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our Home Office. But for a fee of $5, accompanied with a model or drawing and description, we have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a patent, &c., made up and mailed to the inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through our Branch Office, corner of F and Seventh streets, Washington, by experienced and competent persons. Many thousands such examinations have been made through this office. Address MUNN & CO., No. 37 Park Row, New York.

HOW TO MAKE AN APPLICATION FOR A PATENT.

Every applicant for a patent must furnish a model of his invention if susceptible of one; or, if the invention is a chemical production, he must furnish samples of the ingredients of which his composition consists, for the Patent Office. These should be securely packed, the inventor's name marked on them and sent, with the Governmentfees, by express. The express charge should be pre-paid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by draft on New York, payable to the order of MUNN & CO. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but, if not convenient to do so, there is but little risk in sending bank-bills by mail, having the letter registered by the postmaster. Address MUNN & CO., No. 37 Park Row, New York.

The revised Patent Laws, enacted by Congress on the 2d of March, 1861, are now in full force, and prove to be of great benefit to all parties who are concerned in new inventions.

The duration of patents granted under the new act is prolonged to SEVENTEEN years, and the Government fee required on filing an application for a patent is *reduced* from **$30** down to **$15.** Other changes in the fees are also made as follows —

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Re-issue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing a Disclaimer	$10
On filing application for Design, three and a half years	$10
On filing application for Design, seven years	$15
On filing application for design, fourteen years	$30

The law abolishes discrimination in fees required of foreigners, excepting natives of such countries as discriminate against citizens of the United States—thus allowing Austrian, French, Belgian, English, Russian, Spanish and all other foreigners except the Canadians, to enjoy all the privileges of our patent system (but in cases of designs) on the above terms. Foreigners cannot secure their inventions by filing a caveat; to citizens only is this privilege accorded.

During the last seventeen years, the business of procuring Patents for new inventions in the United States and all foreign countries has been conducted by Messrs. MUNN & CO., in connection with the publication of the SCIENTIFIC AMERICAN; and as an evidence of the confidence reposed in our Agency by the inventors throughout the country, we would state that we have acted as agents for at least TWENTY THOUSAND inventors! In fact, the publishers of this paper have become identified with the whole brotherhood of inventors and patentees at home and abroad. Thousands of inventors for whom we have taken out patents have addressed to us most flattering testimonials for the services we have rendered them, and the wealth which has inured to the inventors whose patents were secured through this office, and afterward illustrated in the SCIENTIFIC AMERICAN, would amount to many millions of dollars! We would state that we never had a more efficient corps of Draughtsmen and Specification Writers than are employed at present in our extensive offices, and we are prepared to attend to patent business of all kinds in the quickest time and on the most liberal terms.

CAVEATS.

Persons desiring to file a caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention. The Government fee for a caveat, under the new law, is $10. A pamphlet of advice regarding applications for patents and caveats, printed in English and German, is furnished gratis on application by mail. Address MUNN & CO., No. 37 Park Row, New York.

ASSIGNMENTS OF PATENTS.

Assignments of patents, and agreements between patentees and manufacturers are carefully prepared and placed upon the records at the Patent Office. Address MUNN & CO., at the Scientific American Patent Agency, No. 37 Park Row New York.

It would require many columns to detail all the ways in which inventors or patentees may be served at our offices. We cordially invite all who have anything to do with Patent property or inventions to call at our extensive offices, No. 37 Park Row, New York, where any questions regarding the rights of patentees will be cheerfully answered.

Communications and remittances by mail, and models by express (prepaid), should be addressed to MUNN & CO., No. 37 Park Row New York.

REJECTED APPLICATIONS.

We are prepared to undertake the investigation and prosecution of rejected cases on reasonable terms. The close proximity of our Washington Agency to the Patent Office affords us rare opportunities for the examination and comparison of references, models, drawings documents, &c. Our success in the prosecution of rejected cases has been very great. The principal portion of our charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted are invited to correspond with us on the subject, giving a brief story of the case, inclosing the official letters, &c.

FOREIGN PATENTS.

We are very extensively engaged in the preparation and securing of patents in the various European countries. For the transaction of this business we have offices at Nos. 66 Chancery lane, London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. We think we can safely say that THREE-FOURTHS of all the European Patents secured to American citizens are procured through the Scientific American Patent Agency, No. 37 Park Row, New York.

Inventors will do well to bear in mind that the English law does not limit the issue of patents to inventors. Any one can take out a patent there.

Circulars of information concerning the proper course to be pursued in obtaining patents in foreign countries through our Agency, the requirements of different Government Patent Offices, &c., may be had gratis upon application at our principal office, No. 37 Park Row, New York, or any of our branch offices.

Notes and Queries

R., of D. C.—Your article on breech-loading rifles has ust been received and will meet with attention.

J. M. C., of Honolulu, S. I.—We advise you to get a good 10-horse power steam engine and a boiler of the first quality for your purpose. We cannot recommend an air engine of such power.

J. B. J., of C. W.—A most excellent non-conducting material for covering your steam boiler is common lime plaster mixed with hair. It should be boxed in with board on the outside to prevent it from cracking and falling off. Thick felting answers fully better, but it is expensive—the cement will answer your purpose just as well.

C. W. T., of Va.—Sheets of horn are made by softening the horns of cattle by steam or boiling water, then scraping their surfaces, splitting them open and submitting them to pressure in a hydraulic press.

W. S. M., of N. J.—The locomotive boiler is the most economical in fuel for general use.

J. S., of Pa.—The method of treating flax which you have described will not produce a staple capable of being spun on cotton machinery. The process is also more crude, expensive and inefficient than modes which are more practiced.

A. C. C., of Iowa.—You will find an illustrated article on the deviation of balls to the right, caused by the earth's rotation, on page 293, Vol VI., current volume of the SCIENTIFIC AMERICAN.

C. H. M., of Pa.—Your plan of constructing turrets is the identical one used upon the *Keokuk*. You are doubtless well aware of her fate.

A. B., of Mass.—We cannot direct you to any maker of lathes for turning hammer handles.

Money Received

At the Scientific American Office, on account of Patent Office business, from Wednesday, April 8, to Wednesday, April 15, 1863:—

W. S. J., of N.Y., $150; G. D., of Pa., $25; D. H. P., of Conn., $25; V & W., of Wis., $25; J. P., of N. Y., $25; E. W., of N. H., $61; J. B., of Wis., $16; W. F., of Conn., $25; D. R. W., of Iowa, $15; L. & H., of Pa., $16; L. N. L., of Mass., $50; J. McC., of N.Y., $16; N. A. & Co., of Conn., $25; J. B., of Iowa, $52; J. W. S., of Conn., $41.; L. D., of N.Y., $20; M. H. M., of Mo., $20; C. R., of N. J., $25; A. B., of Conn., $25; W. S. J., of Minn., $16; W. H. F., of Mass., $35; R. R., of Ill., $10; W. K. L., of Mass., $30; W. & T., of Mass., $16; G.B. D., of Ill., $25; G. B. I., of Vt., $25; J.H.M., of Mo., $10; J. D.' of N. J., $16; J. B. F., of N. H., $25; P. & B., of N.Y., $16; L.D., of N.Y., $25; M. H. S., of Ohio, $25; D. E. B., of Pa., $20; S. R., of N. Y., $20; R. K., of Mass., $41; A. W. S., of Mass., $16; S. R., of Ohio, $16; J. C., of Ohio, $15; J. N. N., of Iowa, $21; J. C., of Mass., $16; C. M. S., of Pa., $25; H. H. B., of N. Y., $16; G. W. D., of N. Y., $16; H. B.M., of N.Y., $15; R. H. S., of Mich., $16; J.C., of Ind., $21; J. V. D., of N. J., $10; H. H. E., of Conn., $25; G. L., of N. J., $16; T. N. D., of Ind., $10; J. J. McC., of N. Y., $25; T. D. R., of N. Y., $20; N. S., of Ind., $20; G. A. P., of N.Y., $16; A. & W., of N. Y., $10; I. W. L., of Mich., $56; L. M. Van. S., of N. J., $20; R. H. G., of N. Y., $20; M. G., of N. Y., $41; A. F., of N. Y., $16; D. W. H. & Co., of Ill., $100; E. C. H., of N. Y., $25; T. R. L, of France, $29; C. A. M., of Wis. $25; W. M., of N. Y., $20; S. C. K., of Mo., $20; J. H. A., of N. Y., $45. J. M. P., of Ill., $65; Y. & T., of N. Y., $16; J. B., of N. J., $16; R. M., of N. Y., $20; W. M. D., of N. Y., $25; J. A. B., of Ohio, $20; N. P. B., of N. Y., $20; L. B., of N. Y., $16; S. E. T., of N.J., $51; G. W. T., of Mich., $20; W. D. D., of Ill., $45; S. T., of Cal., $41; A. W., of N. Y., $44; H. N., of N. Y., $25; S. T of Cal., $25; J. H. L. T., of Ill., $40.

Persons having remitted money to this office will please to examine the above list to see that their initials appear in it, and if they have not received an acknowledgment by mail, and their initials are not to be found in this list, they will please notify us immediately, and inform us the amount, and how it was sent, whether by mail or ex dress.

Specifications and drawings and models belonging to

parties with the following initials have been forwarded to the Patent Office from Wednesday, April 8, to Wednesday, April 15, 1863:—

E. C. H., of N. Y.; W. M. D., of N. Y.; H. N., of N. Y.; J. R. L., of France; S. T., of Cal.; R. H., of Mass.; S. E. T., of N. J.; A. W., of N. Y.; H. and J., of Iowa; W. K. L., of Mass; C. M. S., of Pa.; W. H. F., of Mass.; J. P., of N. Y.; J. N. N., of Iowa; C. C. W., of Ill., V. and W., of Wis.; D. H. P., of Conn.; C. R., of N. J.; G. D., of Pa.; A. B., of Conn.; J. C., of England; J. B., of Iowa (2 cases); M. H. S., of Ohio; N. A. & Co., of Conn.; L. D., of N. Y.; J. J. McC., of N. Y.; H. H. E., of Conn.; G. B. D., of Ill.; W. F., of Conn.; H. C D., of C. W.; J. B. F., of N. H.; N. L. L., of Mass. (2 cases); J. F. J of N. Y.; E. W., of N. H.; G. B. I., of Vt.; T. N. D., of Ind.; M. G., of N. Y.

RATES OF ADVERTISING.

Twenty-five Cents per line for each and every insertion, payable in advance. To enable all to understand how to compute the amount they must send in when they wish advertisements inserted, we will explain that ten words average one line. Engravings will not be admitted into our advertising columns; and, as heretofore, the publishers reserve to themselves the right to reject any advertisement they may deem objectionable.

TO PERSONS ENGAGED IN MANUFACTURING ARTICLES used in Woolen Mills.—I desire to obtain the address of all persons engaged in manufacturing articles used in Woolen Mills, such as Reed-makers, Shuttle-makers, Bobbin-makers, Picker-makers, Comb-makers, &c.; also manufacturers of Patent Oil-cans, Patent Temples, Patent Heddles and all other patented articles used or connected with Woolen Mills. Parties interested please take notice and send their business card to THOMAS STIBBS, Dealer in Manufacturers' Supplies, Wooster, Ohio. 17 tf

WANTED, BY A YOUNG PRACTICAL MACHINIST, a situation as engineer or assistant draughtsman. Address WILLIAM BROOKS, Italy Hollow, N. Y. 1*

LABORATORY OF INDUSTRIAL CHEMISTRY.—ADVICE and consultations on chemistry applied to arts, manufactures, agriculture, &c. Processes of chemical fabricatures, plans and drawings of factories and apparatus. Analyses and commercial essays in general. Address Prof. H. DUSSAUCE, Chemist, New Lebanon, N. Y. 17 1*

10,000 GALLONS.—WANT TO BUY THREE or four large boilers, or tanks, to hold from 3,000 to 10,000 gallons each. Any one having such, which they will offer cheap, will find a purchaser by addressing P. C., Box 3,488, New York Post Office. 18 2

EXCELSIOR MOWER AND REAPER—THE BEST IN use—the patent for sale or lease. A fortune can be made by building these machines. Territories for sale. Send for a circular and you will get all the particulars. ROBERT BRYSON, Schenectady, N. Y. 17 5*

GROVER & BAKER'S CELEBRATED FIRST PREMIUM Sewing Machines, 495 Broadway, New York. The Grover and Baker S. M. Co. are the only parties who manufacture and sell machines which both sew perfectly and embroider perfectly. 17 4

AERONAUTIC.—AN EXPERIENCED MILITARY aeronaut, formerly in the French army, is ready to accept an engagement of a private or public character. He has all the instruments used in the French army for its military operations; also, the receipt of 200 ascensions. A note addressed to MILITARY AERONAUT, Bordentown, N. J., will receive prompt attention. 1*

PLATINA! PLATINA!!—FOR USES OF CHEMISTS, Dentists, Gunsmiths, Electro-platers, Telegraph Batteries. Acid Manufacturers, &c. SUTTON & RAYNOR, 748 Broadway, New York. 17 4*

WANTED.—A SECOND-HAND ENGINE LATHE that will swing 48 inches over ways. Short ways preferred. The price must be low. Address MACHINIST, Box 167, Houghton, Mich. 17 2*

"INVENTIONS AND THEIR RESULTS."—A NEW book just published. Send four stamps (12 cents), and procure a specimen copy, and agency. Agents wanted everywhere to solicit orders. Address HARRIS BRO'S, Box 302, Boston, Mass. tf

OFFICE OF THE SIGNAL OFFICER.

WAR DEPARTMENT,
WASHINGTON, D. C., April 11, 1863.

Sealed Proposals will be received at this Office until 4 o'clock, P. M., on the 30th day of April, 1863, for furnishing to the Signal Department the follo wing articles:—

300 Three hundred Telescopes, complete.
200 Two hundred Marine Glasses, do.
250 Two hundred and fifty Compasses.
40 Forty Telescopes, extra size, with stands.

The first delivery to be made about the 15th day of June, 1863, or as soon thereafter as Government may direct; the balance to be delivered on or before the 1st day of August, 1863.

A bond, with good and sufficient security, will be required.

Proposals from disloyal persons, or where the bidder is not present to respond to his bid, will not be considered.

The names of firms should be stated in full, with the precise address of each member of the firm.

All bids to be accompanied by two guarantees, and directed to Signal Officer of the Army, and endorsed "Proposals for Field Signal Equipments."

Form of Guarantee.

We, ——, of the county of ——, and State of ——, do hereby guarantee that —— is able to fulfill the contract in accordance with the terms of his proposition, and that should his proposition be accepted he will at once enter into a contract in accordance therewith.

Should the contract be awarded to him we are prepared to become his securities.

(This guarantee must be appended to each bid.)

The responsibility of the guarantors must be shown by the official certificate of the clerk of the nearest district court, or of the United States District Attorney.

The right is reserved to reject all proposals if the prices are deemed too high, or if, for any cause, it is not deemed for the public interest to accept them.

Models will be on exhibition at the office of the Signal Officer for fifteen (15) days from date. 17 2

ORDNANCE OFFICE,

WAR DEPARTMENT,
WASHINGTON, March 3, 1863.

PROPOSALS will be received at this office until 4 o'clock P.M. on the 30th of APRIL, 1863, for furnishing six hundred Wrought-iron Beams for Rails of Chassis of Sea-coast Carriages.

These beams are to be made after the following specifications:—

The rail for barbette carriages is a rolled wrought-iron beam, similar in appearance to the "I"-shaped beams used in the construction of fire-proof buildings. It is required to be straight and smooth on its surface, and free from flaws, imperfect welds, blisters and cinder streaks. The outer surfaces of the two flanges are planes, parallel to each other, and at right angles to the web. The web joins the two flanges along their middle line, leaving them to project equally on each side, and must be without bends or corrugations.

DIMENSIONS OF BEAMS.

Length of rail	171	inches.
Depth between outer surfaces of flanges	15	"
Width of flanges	5·375	"
Thickness of flange at outer edge	·75	inch.
Thickness of web	·625	inch.

These beams will be inspected after the following rules:—

They are to be made of good tough well-worked clear iron, the absence of which qualities (generally indicated by roughness of surface, and by checks and more marked roughness along the edges of the flanges), as also flaws, or bad welds, blisters and streaks of cinder will cause their rejection.

1st. They are to be of the required dimensions and square at the ends.

2d. They are to be straight and free from short bends in the flanges and webs.

3d. The outer plane surfaces of the flanges are to be parallel to each other, and in planes perpendicular to that of the web.

4th. The webs are not to be bent or *troughed*, as would result from resting the rails along their whole lengths on the edges of the flanges, while the webs are too hot to bear their weight.

5th. The flanges are to be perfectly equal on each side of the web.

VARIATIONS ALLOWED IN INSPECTING.

In length of rail	·50 inch.
In depth of rail	·10 inch.
In thickness of web	·05 "
In warp or wind, in depth of flange at extreme end of rail	·10 in .
Difference in distance between outer edges of plane surfaces of flanges on different sides of web at any cross section of rail	·10 inch.
A straight edge of equal length with the rail placed on the outer edge of the flange should not depart from it at any point more than	·15 inch.
A plane surface placed on the web should not depart from it any point more than	·10 inch.
A plane surface placed on the plane surface of either flange should not depart from it at any point more than	·10 inch.
Departure from square in depth of rail	·15 inch.

Specimens of the beams, or drawings of them, can be seen at the United States Arsenals at Fortress Monroe, Va., Bridesburg and Pittsburgh, Pa., and Watertown, Mass.

Bidders will state the number of beams they propose to furnish, the time when they will commence the delivery, which should be as early as possible, and the number they can deliver weekly after commencing delivery, place where they will make them, and the price per pound for which they will deliver them at the point of vessel or railroad shipment nearest to their works.

No bids will be entertained except from persons actually engaged in the manufacture of iron, evidence of which must accompany the bid.

Each party obtaining a contract will be required to enter into bonds, with proper sureties for its faithful fulfillment; and the transfer of the contract to another party will cause its entire forfeiture.

The right is reserved to reject all proposals if the prices are deemed too high, or, if for any cause, it is not deemed for the public interest to accept them.

Proposals will be sealed and addressed to "GENERAL J. W. RIPLEY, Chief of Ordnance, Washington, D. C.," and will be indorsed "Proposals for Wrought-iron Beams." JAS. W. RIPLEY,
16 3 Brigadier-General, Chief of Ordnance.

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THE CHEAPEST MODE OF INTRODUCING INVENTIONS.

INVENTORS AND CONSTRUCTORS OF NEW AND useful Contrivances or Machines, of whatever kind, can have their Inventions illustrated and described in the columns of the SCIENTIFIC AMERICAN on payment of a reasonable charge for the engraving.

No charge is made for the publication, and the cuts are furnished to the party for whom they are executed as soon as they have been used. We wish it understood, however, that no secondhand or poor engravings, such as patentees often get executed by inexperienced artists for printing circulars and handbills from, can be admitted into these pages. We also reserve the right to accept or reject such subjects as are presented for publication. And it is not our desire to receive orders for engraving and publishing any but good Inventions or Machines, and such as do not meet our approbation in this respect, we shall decline to publish.

For further particulars, address—

MUNN & CO.,
Publishers of the SCIENTIFIC AMERICAN,
New York City.

BUREAU OF ORDNANCE.

NAVY DEPARTMENT,
Washington City, April 1, 1863.

This Bureau is desirous of ascertaining whether rifled cannon can be made of wrought iron of sufficient and uniform endurance and economy to warrant their being preferred to guns of cast iron only, or of cast iron strengthened with wrought iron.

Proposals will therefore be received from any manufacturers of forged iron, to furnish a finished gun, or a block of metal from which the same may be finished.

The said gun, when finished, to weigh about 10,000 pounds, to be made into a gun throwing a projectile of 100 pounds, as used in cast iron rifled cannon of like weight, to be fired 1,000 times with service charges of the same weight and kind of powder as used in the Parrott 100-pounder, viz: 10 pounds of No. 7, without bursting or wearing in such a manner as to cause apprehensions of bursting.

The quality of metal, price, and other terms, are to be stated clearly in the proposals forwarded.

The Bureau reserves the right to itself of accepting or rejecting any of the proposals.

The time for receiving the proposals is limited to sixty days from date; and proposals will only be received from persons actually engaged in the fabrication of wrought iron.

JOHN A. DAHLGREN, Chief of Bureau.

15 8

IMPORTANT PRACTICAL BOOKS.

Statistics of Coal; including Mineral Bituminous Substances employed in Arts and Manufactures; with their Geographical, Geological and Commercial Distribution and amount of Production and Consumption on the American Continent. With Incidental Statistics of the Iron Manufacture. By R. C. Taylor. Second edition, revised by S. S. Haldeman. Illustrated by five maps and many wood engravings. 8vo., cloth, $6.

The Coal Trade of British America; with Researches on the Character and Practical Values of American and Foreign Coals. By Walter R. Johnson, Civil and Mining Engineer and Chemist, 8vo., $2.

☞ This volume contains the results of the experiments made for the Navy Department, and upon which their coal contracts are now based.

The Manufacture of Iron in all its various branches, including an Essay on the Manufacture of Steel. By F. Overman. Illustrated by 150 engravings. Third edition, 8vo., cloth, $5.

Strength and other Properties of Metals. Reports of Experiments on the Strength and other Properties of Metals for Cannon. With a description of the machines for testing metals, and of the classification of cannon in service. By Officers of the Ordnance Department, U. S. Army. By authority of the Secretary of War. Illustrated by 25 large steel plates. In one vol. quarto, $10. ☞ The best treatise on cast iron extant.

The Practical Metal Worker's Assistant, for Tin-plate Workers, Braziers, Coppersmiths, Zinc-plate Ornamenters and Workers, Wire Workers, Whitesmiths, Blacksmiths, Bell-hangers, Jewellers, Electrotypers, and all other Workers in Metals and Alloys. By Oliver Byrne. Illustrated, 8vo., cloth, $7 50.

The Hand-book for the Artisan, Mechanic and Engineer; containing Instructions in Grinding, Sharpening of Cutting Tools, Figuration of Materials by Abrasion, Lapidary Work, Gem and Glass Engraving, Varnishing and Lackering, Abrasive Processes, &c. By Oliver Byrne. Illustrated with 11 large plates and 185 cuts. 8vo., cloth, $5.

The Practical Model Calculator, for the Engineer, Mechanic, Machinist, Manufacturer of Engine-work, Naval Architect, Miner and Millwright. By Oliver Byrne. Illustrated, 8vo., cloth, $3 50.

The Practical Brass and Iron Founder's Guide; a Concise Treatise on the Art of Brass Founding, Molding, &c., with numerous Practical Rules, Tables and Receipts for Gold, Silver, Tin and Copper Founding; Plumbers, Bronze and Bell Founders, Jewelers, &c. By James Larkin, Conductor of the Brass Foundry Department, at Reaney, Neafie & Co.'s Works, 12o., $1.

☞ The above, or any of my publications, sent by mail free. Catalogues, including important works now in press, sent free of postage on application. HENRY CAREY BAIRD, Publisher of Practical Books, 406 Walnut street, Philadelphia. 1

HOW TO GET THE NEW YORK DAILY SUN, WITH the postage paid, for one cent! Get your postmaster or storekeeper to receive 20 cents each from 15 persons, and remit it ($3), and we will send him 15 copies of *The Sun*, postage paid, for 20 days. More money will pay for a longer time. MOSES S. BEACH, Proprietor of *The Sun*, corner of Fulton and Nassau streets, New York. N. B.—*The Weekly Sun* is only 50 cents a year. 16 4g

DAMPER REGULATORS.—GUARANTEED TO EFfect a great saving in fuel, and give the most perfect regularity of power. For sale by the subscribers, who have established their exclusive right to manufacture damper regulators, using diaphragms or flexible vessels of any kind. Orders promptly attended to, or information given, by addressing CLARK'S PATENT STEAM AND FIRE REGULATOR COMPANY, 229 Broadway, New York.
Responsible agents wanted. 16 26*

THE "KING MICROSCOPE"—DOUBLE LENS.—Prof. Horsford, of Harvard University, says: "It works very well, and you have got it up very neatly." Magnifies 25 diameters—55 cents in Postal Currency. The "BOWEN MICROSCOPE," 28 cents. The "S. WOODWARD MICROSCOPE," 38 cents. Or one each of the three kinds for $1. All free of postage.
Address T. EDWIN KING, Box 330, Boston, Mass. 15 4*

TO LEASE OR FOR SALE—THE FOUNDRY KNOWN as the "Newark Machine Co.'s Foundry," situated on High street, in the city of Newark, N. J.—building 80 feet long by 85 feet deep, 30 feet high, slate roof, with molding pit, three melting stacks, three cranes, &c., all in perfect order to carry on the regular foundry business; also large brass furnaces, &c., arranged especially for casting cannon; also, dwelling house adjoining, 30 feet square, and kitchen; also, barn on Boyden street. The whole, with over an acre of land attached, will be leased or sold, together with a valuable water privilege. Address or apply to THOS. B. NORRIS, No. 2 Washington place, Newark, N. J., or ROBERT VAN ARSDALE, Esq., "Morris Buildings." The foundry building can readily be converted into a three-story factory, and made suitable to other manufacturing business. 16 2*

FORT WAYNE SPOKE, HUB AND BENDING FACTORY.—We wish to correspond with inventors of machines for bending plow handles with a view of purchasing a machine and right. OLDS, HANNA & CO. 16 2*

A VALUABLE WORK FOR INVENTORS, PATENTEES AND MANUFACTURERS.

The publishers of the SCIENTIFIC AMERICAN have just prepared, with much care, a pamphlet of information about Patents and the Patent Laws, which ought to be in the hands of every inventor and patentee, and also of manufacturers who use patented inventions. The character of this useful work will be better understood after reading the following synopsis of its contents:—

The complete Patent Law Amendment Act of 1861—Practical Instructions to Inventors, how to obtain Letters Patent, also about Models—Designs—Caveats—Trade-marks—Assignments—Revenue Tax—Extensions—Interferences—Infringements—Appeals—Re-issues of Defective Patents—Validity of Patents—Abandonment of Inventions—Best Mode of Introducing them—Importance of the Specification—Who are entitled to Patents—What will prevent the Granting of a Patent—Patents in Canada and European Patents—Schedule of Patent Fees; also a variety of miscellaneous items on patent law questions.

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Self-adjusting Elastic Packing.

All persons who have ever been in charge of steam machinery, and also owners of the same, have felt the inconvenience and expense which attends the renewal of the packing about the valve stems, piston rods, and other parts of the machinery working through vessels containing water or steam. This trouble is not at all an imaginary one, and is sometimes a source of much vexation, wearing the rods unevenly, forcing the piston to one side of the cylinder when the packing is done by unskillful hands, in short, making a great deal of work. The difficulties set forth above are obviated by the packing herewith illustrated. It consists merely of two rings, A and B, Fig. 1, one let into the other; these are surrounded by a steel spring, seen at *a*, which confines the packing and keeps it from springing apart prematurely. The lower end of the gland, C, is chambered out and has a brass collar, D, screwed into it; this collar and the gland forms a chamber in which the packing is contained. The outside of the gland is turned off at the lower end, so as to be slightly less in diameter than the main body of it. This decreased diameter is provided with a number of small holes, *b*, through which the fluid or steam finds its way to the packing rings. The pressure on the rings in packing is therefore always proportioned to the work being performed. These rings are said to keep a perfectly tight joint between the cylinder and the atmosphere, and are always in good working order. They certainly oppose very little surface to the action of the rod, and exert less friction on it than the ordinary hemp gasket. They are cut into three or more sections, according to the size of the rod. Fig. 2 shows the rings separated from the gland. This invention was patented on Feb. 10, 1863, by John Johnson, of Roxbury, Mass.; further information can be had by addressing him at Sudbury street, Roxbury, Mass., or H. D. Ward, 42 Kilby street, Boston, Mass.

Fig. 1

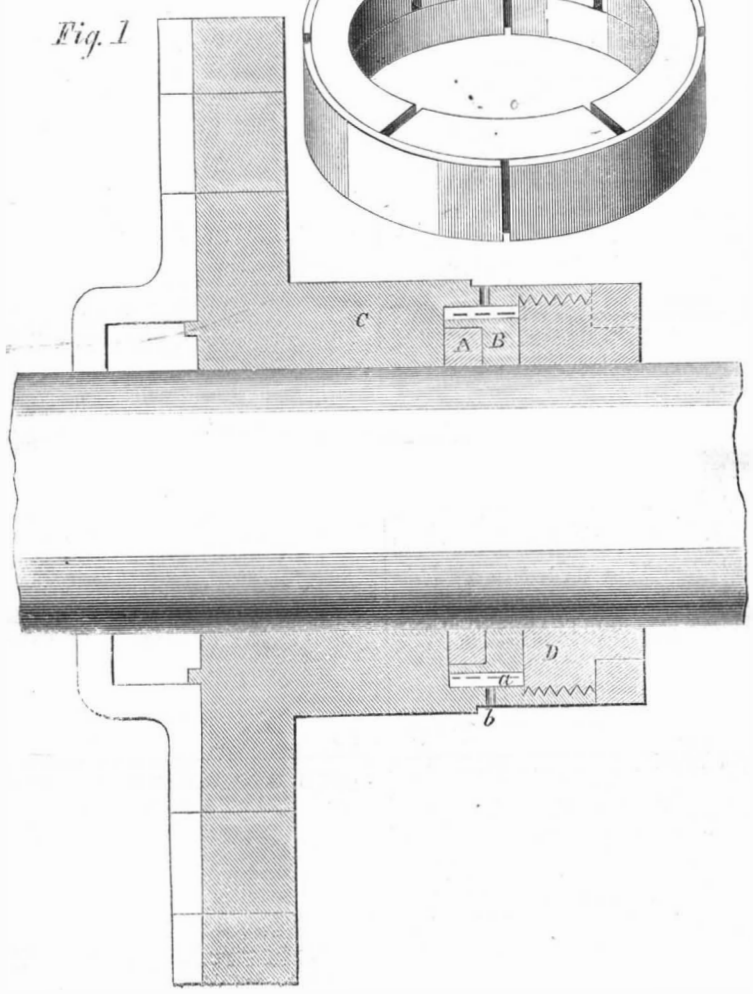

Fig. 2

JOHNSON'S PATENT PISTON-ROD PACKING.

It is said that Paul Morphy has been beaten at chess by a Frenchman.

Ancient Copper Workings.

The Lake Superior *Mining Gazette* states that the editor lately made a visit to the Portage mines, for the purpose of examining an ancient copper pit which has just been opened, and which, in some respects, is the most remarkable of those relics of an unknown race of miners having worked the copper lodes of the Lake Superior regions centuries before the New World was discovered by Columbus. The *Gazette* says:—

"The ancient miners have worked down on the hanging wall side, about ten feet below the surface of the rock, where further progress was prevented by an almost continuous floor of copper. The copper in this floor is exceedingly pure and massive, and most singular of all, many of the lately-exposed faces bear evidence of having been cut with some small sharp instrument! These marks are distinctly visible in several places, the marks and impressions being as clear and sharp as if made within the past year. This, we believe, is the first instance where it was apparent that any of the ancient miners had tools of sufficient hardness to cut copper, even after being considerably softened by the action of fire. It is quite evident that, as in almost every old pit which has been opened in the country, fire has been the agent used to soften the metal before it was cut off, as the rocks bear evidence of calcination. Several stone hammers have also been taken out of the waste rock and earth, which has been piled up in the pit, and pieces of birch bark and burnt wood have been found intermixed. As yet the pit is only partly cleaned out, and we may expect to see other curiosities and peculiarities when the *debris* is all removed. Another interesting feature is the fact that the bottom of the trench is nearly one continuous bed of copper."

The Human Eye.

The language of the eye is very hard to counterfeit. You can read in the eyes of your companion, while you talk, whether your argument hits him, though his tongue will not confess it. There is a look by which a man shows he is going to say a good thing, and a look when he has said it. Vain and forgotten are all the fine offices of hospitality, if there be no holiday in the eye. How many furtive invitations are avowed by the eye though dissembled by the lips. A man comes away from a company; he has heard no important remark, but if in sympathy with the society, he is cognoscent of such a stream of life as has been flowing to him through the eye. There are eyes which give no more admission into them than blue berries; others are liquid and deep wells that men might fall into; and others are oppressive and devouring, and take too much notice. There are asking eyes, and asserting eyes, and prowling eyes, and eyes full of faith—some of good and some of sinister omen.—*Emerson.*

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FROM THE STEAM PRESS OF JOHN A GRAY

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